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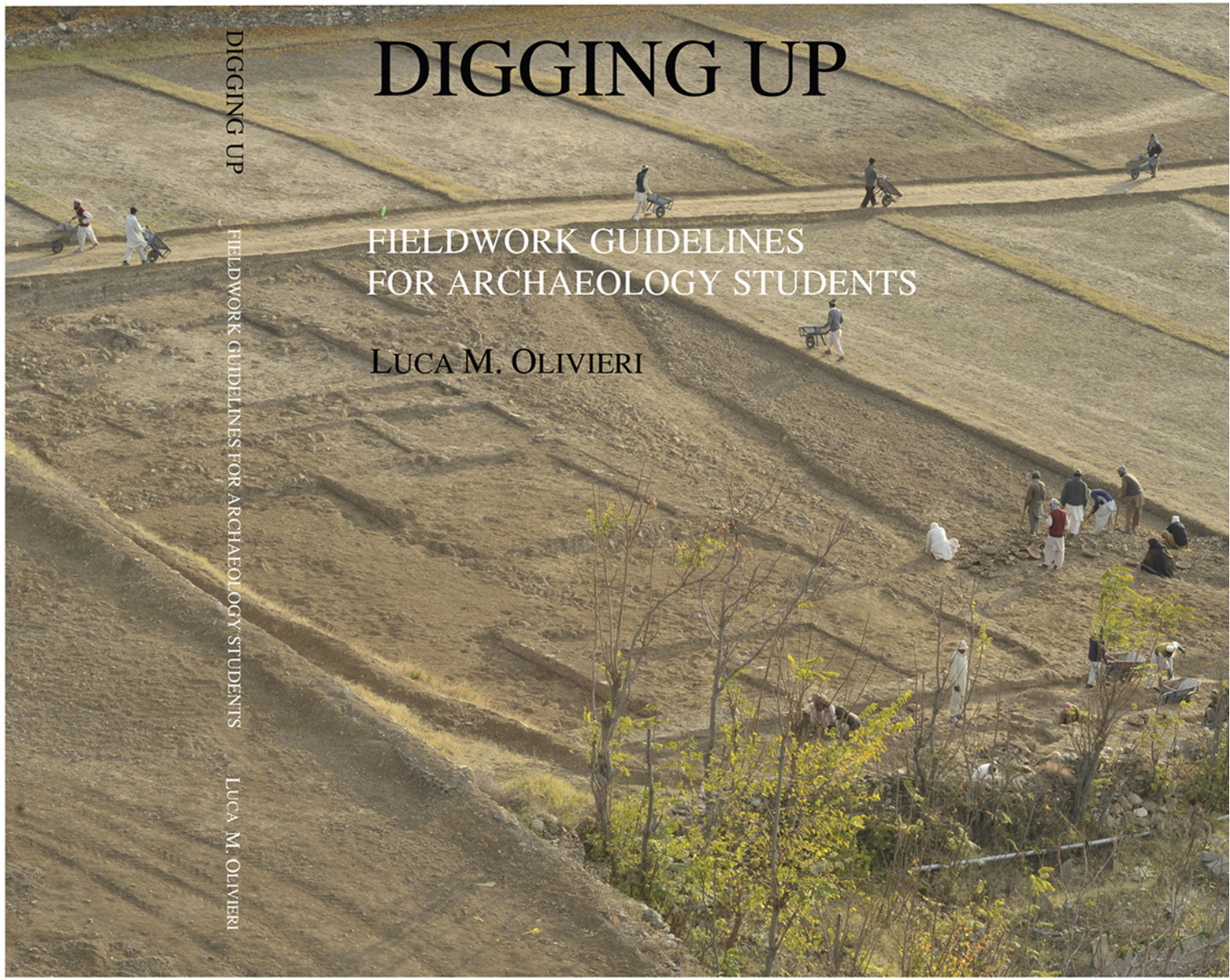

DIGGING UP

FIELDWORK GUIDELINES FOR ARCHAEOLOGY STUDENTS

LUCA M. OLIVIERI

DIGGING UP

FIELDWORK GUIDELINES FOR ARCHAEOLOGY STUDENTS

LUCA M. OLIVIERI

Italian
Development
Cooperation

Archaeology, Community, Tourism.
ACT

Pakistan-Italian Debt Swap Program
Italian Archaeological Mission in Pakistan
Directorate of Archaeology and Museums, KP Province

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LUCA M. OLIVIERI

FOREWORD BY
GIOVANNI LEONARDI

DRAWINGS BY
FRANCESCO MARTORE

PAKISTAN-ITALIAN DEBT SWAP PROGRAM
Italian Archaeological Mission in Pakistan
Department of Archaeology and Museums
Government of Khyber-Pakhtunkhwa

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Luca M. Olivieri


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A PROJECT BY
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IMPLEMENTED BY
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WITH THE COLLABORATION OF
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UNDER THE VIGILANCE OF
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FOREWORD

It is with a deep emotion that I present a textbook on archaeological stratigraphy and field practices dedicated to the current reality of Pakistan. I was similarly moved when in the early 80ies I was asked to join the German-Italian archaeological project at the great early urban Bronze age site of Mohenjo-Daro. For an archaeologist, the piedmont valleys of the Hindukush and the plains of Sindh are different contexts. However, the great cultures of Swat and their impressive, endangered heritage are not less important; and archaeological excavations are made with sound principles and effective methods, and not with personal feelings.
While most field manuals begin with abstract theoretical propositions, to move tackling with pratical issues (such as the organization of the archaeological yard) as these latter were secondary, menial aspects, the approach of Luca M. Olivieri goes the other way round. Following the first pages of this book, students will learn to appreciate the advantages of a straight, rational organization of the trench, including issues that are regularly neglected in other books of the same type – like the composition of the excavating teams, the location and maintenance of the excavation dirt, the control of the water running on surface and across the exposed ruins. A clear historical understanding – the Author seems to suggest – depends also upon a neat setting, since the first steps, of an archaeologist's experimental workbench.
Another crucial aspect of this text is its practical vision. While condemning without any ambiguity the criminal destruction of Swat's archaeological heritage by illegal diggers, as the careless planning of agricultural works and modern construction across important archaeological sites, Olivieri is aware of the fact that the recent impact - even in form of exposed sections – sometimes may be utilized as possible windows to the past. It is a generous effort to create order and information even from what, too often, is turning into a depressing chaos.
The auther leads student to a proper planning of surface surveys (in the peculiar situation of mountain slopes), to an exhaustive

planning of the dig, considering also legal frameworks and budgeting, the inventorying of the finds, to restoration and site maintenance.
Readers are invited to view the contents of this book as an evolution, but also as an important change, of the methods and the theoretical background of Mortimer's Wheeler's fieldschool. This change involves a shift from a strongly hyerarchical management of the yard to participation and shared discussion, but also to a more detailed documentation of stratigraphy and, as a consequence, to more critical historical interpretations; from stratigraphic limits conceived as lines that separate "historical periods" to tools for reconstructing the formation processes of the site.
Discussing the drawbacks but also the advantages of different types of cross-sections, and deepening the discussion of special topics in the final appendixes, Olivieri here provides an important methodological trace for an exhaustive documentation of the dig, as the ultimate data base on which holistic interpretations will be built, after the end of the field activities.
Finally, modern technologies of recording are welcome, but young Pakistani archaeologists will better learn that no electronic device will ever substitute their individual feeling for the earth and the history of their wonderful country.

Giovanni Leonardi

Professor of Palethnology, and Stratigraphy and Formation Processes
Cultural Heritage Department
University of Padua

To the memory of Domenico Faccenna

1. Introduction

This short book gathers the field experience learned during the last three years of excavations in Swat with University students and officers of the Directorate of Archaeology and Museums of the Government of Khyber-Pakhunkhwa. To them, and to the local workers, this work is dedicated.
The booklet, although organized in the form of a manual, is not intended to be a true handbook of excavation, restoration or archaeological survey. Those wishing to pursue the subject further will find a bibliography at the end of the book containing the latest or the more useful contributions in this sense, many of which available for free on the Internet.
The aim of the book is to introduce the student of archaeology to the complex problem of organizing, planning and implementing an excavation campaign. All the topics will be briefly described more in the form of a summary than of an analysis. However, more detailed attention will be focused on points that are often overlooked in the better handbooks, or particularly important in the context.
In our countries archaeologists only rarely have sufficient funds to apply in the field the increasingly advanced technologies available to colleagues in countries where the "cultural heritage" emergency is not so overwhelming. Nevertheless, dealing with urgent and often "emergency" archaeological work, it is possible to do excellent excavation work and obtain very good results following a clear-cut and well-defined working method. In a word: lack of money can not be an excuse.
While new technologies are making the archaeologist's work more standardized and complete, such methods will never replace manual excavation techniques, even when remote sensing technologies are also applied. Excavation and data interpretation remain activities in which the human factor reigns supreme despite all its limits. The capacity to interpret evidence, as well as statistics, is what makes an archaeologist a good professional and so there will always be excavations that are correctly interpreted and others that are interpreted incorrectly. What is important is that there should be good and well documented excavations. This is the aim of this booklet.
Archaeological excavation may be compared to a non-repeatable

laboratory experiment where the analysis coincides with the excavation or with the consequent necessary destruction of the evidence, of the data themselves, or else with the decision to conserve some (unexcavated) evidence rather than other (excavated) evidence. *Post hoc* verification is practically always impossible and therefore it is essential for the entire process of analysis (or of destruction = excavation) to be carried out following a well-defined sequence of carefully planned and constantly documented phases.

2. The work context and the legal bases

Excavating in Pakistan, as in all countries possessing an advanced system of legal protection of the archaeological heritage, is above all an activity subject to legal boundaries. The existing legislation is in practice easy to understand and adopts a relatively simple implementation procedure.
Any excavation activity that does not comply with existing legislation and fails to follow the rules of application may be deemed non legal. Should the intentions of the excavator clearly be to sidestep the law, the excavations would clearly be defined as "illegal".
In all countries with a rich history of settlement and culture the illegal digging besides being a lucrative criminal activity, is an attack on the integrity and richness of the national heritage, whatever the outcome. The most wonderful sculptures, painted vases or coin collections, even when on display in precious showcases in a prestigious foreign museum, if the fruit of illegal digging, have already lost all historical value. They represent an infringement of national and international law and impoverish the cultural heritage of the country of origin, that is, the right of every people to dispose of its cultural assets and to learn about its own history.
Conversely, any object on display without its own proper archaeological context, represents just the evidence of the economic enrichment of a small number of persons, a contribution made to the international antiquarian market, the enjoyment by a privileged part of the world population. Ultimately, these objects retain a mere aesthetic value (and as such have been evaluated economically) and no historical value. Without mentioning the fact that the absence of any context also opens up the likelihood of the objects themselves not being originals.
Why "no historical value"? Because this value comes from the context, from the correlated data, and therefore from everything that can and must be documented by means of a proper archaeological excavation.
An illegal dig is a hole in the ground or a series of holes and tunnels, the sole aim of which is to find an object for which there is a demand on the antiquarian market or from a collector, at the same time destroying the context – that is, other objects, archi-

tecture, evidence, ultimately without respect for anything other than the greed by which this activity is driven. Anyone who has visited an archaeological site after illegal diggers have passed through or has worked on sites having a long history of looting has felt the same frustration and bitterness as they would feel before a burnt forest, a mountain devoured by a quarry or one's home ransacked by thieves.

So far we have considered that illegally excavated objects finally end up "legally" in an actual museum (these long devious practices, often representing outright evasion schemes, have been accurately described by Colin Renfrew). Let us now take the much more frequent case of an object ending up in a private collection. At this point the only person exploiting it will be the owner and his entourage as the object has been stolen and segregated. Sometimes however the object may be shown to an expert. This often happens for various reasons. The scholar may consider that the publication of the object partly offsets the loss of public enjoyment and therefore in publishing it in a specialized journal he is rendering a service to science and to the public at large. For the collector, except for a few enlightened exceptions, this is also a way of increasing the value of the object, often in view of its forthcoming placement on the market. While the scholar is under the impression of using the collector, in actual fact the opposite is true. The published study rarely makes mention of the place of conservation; in any case the object would not be accessible, being located in a private place. Consequently, the only images the public (composed of specialists in view of the nature of the journal) will be those published by the expert. It may be asserted that there will be no opportunity for verification. And what if a measurement were incorrect? Or if the material had been wrongly described? Lastly, what if the object itself were a fake? In the absence of any possible verification, the work is no longer scientific. Paradoxically anyone with a little imagination could write a detailed article on a non-existent object. There is a case on record of a journalist doing just this and getting his article accepted as it complied with all the criteria even if the data were completely invented. Archaeological reviews specializing in southern Asia, like classical archaeological journals, are already rejecting articles on finds from the antiquarian market or from inaccessible private collections.

So far we have touched upon issues that are more ethical than legal. Let us return to the principal theme. Before excavating in Pakistan you need a license. The concept of excavation license was introduced in British India in the early 1930s and it evolved through several amendments to the Ancient Monument Protection Act (VII, 1904), a highly advanced law for the time. Organizations or subjects of acknowledged professionalism may request from the State entity responsible for the custody of the archaeological heritage permission to work under licence, which means on behalf of the State entity, in a semi-autonomous form. These are the essential points. The State has the ownership of the archaeological items, whether excavated or not; the State entity is the custodian; non state entities or subjects, also from a foreign country, can contribute to this custodianship in the name and on behalf of the State entity. Until 1947 this Entity in British India was the Archaeological Survey of India, and after 1948, in Pakistan, the Department of Archaeology and Museums of the Government of Pakistan (Federal).

In Pakistan all the legal issues are regulated by a law that is also a direct, updated heir of the old Protection Act, the Antiquity Act 1975. The latter regulates the role of the Federal Department with its Director General, as custodian of national antiquities.

After the devolution in 2011, the archaeological sites and museums (except sites and museums of national interest) are the responsibility of the Provinces, which have their own legislative powers, thus significantly boosting the role of their own archaeological agencies. Today applications for a license must be addressed to these Entities.

However, the Antiquity Act 1975 and the Federal Department (now under the Ministry of National Heritage) have not been abolished. The Director General (Federal) still represents the State of Pakistan in its relations with other States and with international organizations such as UNESCO (and ICCROM), ICOMOS, etc.

This fact implies - for example - that a foreign mission, once the license has been obtained from the provincial agency, should obtain an endorsement also from the Federal Department.

Another example: since customs is a Federal matter, the Director General (Federal) gives the final authorization to temporary exportation of archaeological material for exhibition.

Requests for export permits for samples for analysis must also be made to the Federal Department, once the permit of the competent Provincial agency is obtained. The Provincial permit is mandatory and has to be attached to the application made to the Federal Department.
These pieces of information are subject to change in the course of time. Since the matter is still in evolution, keep yourself up to the date with the latest developments.
What about survey activities? Anyone can go round photographing ruins if this does not entail any illegal activity. If however a score of students from a university archaeological department search through an area and take pottery samples using tools, etc. it would be advisable for their university to have applied for a survey license from the province in which they are operating. In all circumstances a license represents an ID and is a safeguarding document, an important pass to show the local police, etc.
What does the excavation license tell us? The license identifies the type of work, the site (or sites, or the area), the working group and its team leader, the working period. In other words: where, what and who. In order to ensure that the work is performed in compliance with the terms of the license, the provincial entity appoints a Representative. The latter becomes part of the working group, shares the working hours, board and, preferably, lodging, with the team. The Representative is also paid a daily allowance (set by the Entity on the basis of the existing regulations) by the team, and it is advisable to make sure that this item of expenditure is costed and included in the budget (see Chapter 4). Furthermore, the Representative is generally associated as co-author in the publication of the results of the work, especially if the latter are published immediately as preliminary reports.
Ultimately an excavation (or a survey/inspection with sampling) ultimately produces three things: (1) images and graphic data; (2) descriptive data; (3) objects. These three things must be delivered to the Representative, who will ensure a receipt for them is issued and who will hand everything over to his headquarters. The results of the work are then immediately summarized in a preliminary report to be delivered to the Representative together with (i) the inventory, (ii) a copy of any drawings or photos, and (iii) the objects (N.B. the photos and drawings are and remain the intellectual property of the team and/or the non governmental

BKG 11							
#	Inv. No	Stratigraphy	Description	Conditions	Dimensions	Material	Photo
Seasons 1-2							
1	2083	BKG 11 W 1-2 17 on 64	Hair-pin?	Fair	7.1	Ivory	AK 448, 449
2	2084	BKG 11 W7-8 15 on 22	Ear-plug, concave side. One side decorated with circular parallel incised lines.	Cracked	D 2.7; 1.4	Terracotta	AK 459-462
3	2085	BKG11 W 1-2 17 on 66	Humped bull crude figurine	Rear legs are broken	7.1; 4.6; 2.1	Terracotta	AK 469-471
4	2086	BKG 11	Votive stele: head of male personage (Buddha?) with head-band decorated with row of concentric disks alternating with shtraf-like designs. Frontal part: forehead with cakra marked by 7 dotted points around a central dot. Fragment of single-moulded figurine/ stele.	Chipped. Only the head surviving.	4.4; 3.1; 1.7	Terracotta	ELO 7075, 7076, 7078

Table 1 – Example of Inventory List.

organization, university or foreign holder of the license).
The most delicate issue is obviously that of the findings. As we will see below the excavation finds are progressively documented as they are found together with the stratigraphic metadata (that is Sector, number of stratigraphic unit or SU, date of find). This documentation is made in the field using folders, envelopes, baskets, in the excavation log, on laptop, etc. From all these objects, once cleaned, the objects to be inventoried are chosen. The objects are selected for their exceptionality, state of conservation, importance, etc. For instance, all coins are inventoried but among the potsherds only those with inscriptions or that are painted are inventoried. Whole and restored vases are included, as well as sculptures, even as fragments if they are recognizable. The inventoried objects are listed in the Inventory List (see Table 1) and are delivered together with the Inventory to the Representative, who transfers them to the appropriate museum structure or to his Entity storehouses. The preparation of the inventory is the most delicate phase of all the post-excavation operations. The inventory is a list containing at least the following information: (1) serial number, (2) stratigraphic information, (3) short description, (4) principal measures, (5) material.
In a new excavation the serial numbers start from 1 and in the case of subsequent campaigns, even carried out years laters, continue from the last serial number attributed. In the example given, the number of the first object in the trench opened in 2011

is 2083, as the last number of a trench closed in 2006 was 2082. No further excavations were carried out in the meantime.
The inventory number written on the card given to the object (or directly on the object) must always be preceded by a mark comprising no more than three letters representing the code name of the site being excavated. In our example, the excavation of Birkot-ghwandai is denoted by the acronym BKG. No mention is made of the trench number (in this case 11) as the numbering of the objects follows a serial progression that is unrelated to that of the trenches: it will be the inventory that tells us whether the object comes from trench 7 or 2, and so on.
I repeat: *the inventory number must be physically associated with the object.* In the case of pots and terracotta or stone objects, it may actually be marked on them in Indian ink. On stone, it is also possible to write using modern fine-tipped felt pens which must be avoided in the case of terracotta, which is too porous. Labeling (as this operation is called) must be performed using very small, but legible, characters on a concealed part of the artefact where however it is not exposed to wear (for instance on the inner rim of a vase, rather than on the base). Problems can be avoided by ensuring that each object has its own number written on a label attached to the object or included in an envelope together with the object. This extra work can prove invaluable in the future and limit the problems related to identification.
For coins a slightly more complex procedure is followed as also additional information will be included in the inventory: (1) the weight, (2) the reverse and (3) the shape. As far as the weight is concerned, the use of electronic balances is not recommended as, unless they are of professional quality, they have too large a margin of error : a good jeweller's balance must be included in the excavation equipment. The sides of a coin provides extremely important evidence which unfortunately cannot be obtained from the photographic documentation: it is a matter of indicating the position of the reverse with respect to the obverse. The obverse presents a figure of some kind: turning the coin around the axis of this figure, the figure on the reverse side will either lie in the same axis, be inclined or reversed (see Fig. 1).
To describe this situation an analogy with the hour hand of a clock is used: in the first case (in the same axis) H 12 will be noted down, in the third case H 6, etc.

The shape of the coin cannot simply be described as circular, square, etc. The wear and tear on the coin and the irregularity of the minting means that each coin is unique. The best method is to indicate the shape by drawing by hand a continuous line around the coin on the card itself, which will then be placed with the coin in the same envelope. In this way even if for some reason the coin and its card are separated this profile will be the only way to link them together.

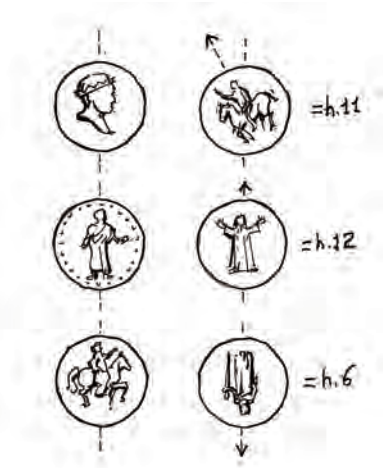


Fig. 1 - Coins: obverse/reverse.

All non metallic objects may be delivered in plastic ziplock envelopes. In the case of iron artefacts this system may be used (as a rule all the objects must be completely dry).

For coins it would be preferable to use paper envelopes. All the envelopes containing coins can be placed in a large ziplock envelope, taking care to remove the air (or alternatively punching holes in the envelope to avoid the accumulation of humidity).

The objects are delivered in numbered crates bearing the name of the excavation, the total number of objects, the total and partial numbers of crates and the excavation season. For example: BKG 11, Objects 52, Crate 3/7 (= the third of seven crates), Autumn 2013.

The packing of each crate is done in the presence of the Representative who ticks off on a copy of the inventory all the objects packed. Care must be taken to insert inert packing material among the objects. Polystyrene balls have been successfully tested (hopefully there won't be a fire in the storeroom!); also straw is excellent or else sheets of newspaper, but not cotton. Do not make too many layers and take care to pack the smaller or more fragile objects in separate baskets or boxes. Then the crate is closed, the relevant information is written large using indelible felt tip pens on at least two sides. A padlock is applied; one key is kept by the team leader and two go to the Representative. For

greater security, the crates should be sealed.
This process is continued while the objects (and crates) last. The crates are then delivered together with a copy of the photos and the preliminary report. The Representative signs the delivery bill and the excavation season can then be considered as officially closed. What is the delivery bill? The bill sets out also the terms and conditions of the delivery and the status of the objects. Until such time as the study of the objects continues, they must be accessible to the team even if the excavation has been concluded in the meantime and until their final publication. For this reason the delivery bill contains the term "temporary custody" by the provincial Entity, in this case on behalf of the organization or team holding the license.
Even if the objects need to be accessible for the purpose of study for a certain number of years (there are no written rules governing this eventuality) the team is responsible for completing the documentation of the objects before packing them in the crates.

3. Before the excavation: the survey

It is good practice to make a thorough inspection of the area in which the excavation site is located.
In archaeology it is important to be able to cross-reference the horizontal observation (survey) with the vertical observation (excavation). The survey produces a set of data that is more undifferentiated in chronological and evaluative terms. For instance, it is possible to overestimate one site owing to its better state of conservation and on the contrary underestimate the size of another owing to the poor surface conditions. In chronological terms there is a risk of constructing data associations that will not be confirmed later. On the other hand, the excavation is able to produce a more reliable chronological sequence which however, owing to the smaller area involved can give rise to other errors of assessment. Of course the diagnostic reliability is greater when the two approaches (horizontal and vertical) are carried out together or in sequence; the greatest reliability (100%) will be achieved in the physical point in which the two processes intersect and will gradually decline the further apart they move. In any case, the two processes, if carried out together, grant a three-dimensional reconstruction of the historical reality of the area. The survey can be carried out in many ways depending on the objectives pursued and the forces available in the field. *The importance of the literary sources and toponomastic should not be underevaluated for the understanding of the territory.*
E. Morigi, with reference to the project of the Archaeological Map of the Swat Valley (AMSV), carried out between 2000 and 2007, prepared the following short summary:

"The survey is carried out using five different techniques, variously combined according to the context encountered:

Intensive transect
This method intensifies the conventional surveying technique in which one or more persons move over a part of the ground counting and defining the presence of archaeological material on surface. The space is divided up into parallel strips about two metres wide and of the same length as the surface to be surveyed.

This is certainly the most systematic method and the one providing the greatest quantity of information as a function also of the intensity and repetitivity of the operation. The drawback is that it demands a heavy investment in time and labour as well as an accurate assessment of the areas surveyed.
Visibility is decisive for a correct sampling as vegetation or crops cause a progressive reduction and thus also a reduction in the possibility of detecting archaeological remains, until a threshold is reached beyond which it is impossible to identify even monumental remains. Consequently the choice of the season ofsampling has a considerable effect on the results (*after the harvest or before fresh ploughing, preferably after heavy rain.* Author's note).
This technique is used on all land free of vegetation or crops and with natural flat surfaces, either slightly sloping (max ca 20°) or with artificial terracing. This is because of the difficulty involved in performing transect surveys on steeper slopes and also because in such circumstances the archaeological record tends to be concentrated downhill under the effect of rainfall and earth slips. Also all the areas with monumental archaeological remains are explored thoroughly using the transect survey so as to gather as much information as possible on the site's function. Transect techniques have no effect on the discovery of monumental remains.

Contour technique
To solve the problem of taking samples along steeper hillsides (min 20°- max 50° ca), a contour exploratory technique is preferred: the method consists in travelling over hillsides maintaining a constant level and continuing horizontally at the prescribed level. Of course the presence of natural obstacles sometimes means that the same level cannot be maintained. A zig-zag trajectory is followed inside a strip lying between two relatively closely spaced levels which could vary by up to a few dozen metres. Also in this case two or more team members make possible to subdivide the space into survey bands on several different levels and to simultaneously explore several parallel areas.
This technique is effective only in the case of archaeological evidence of a monumental nature but is combined with the transect technique on any section of land that allos it, such as stepped or

terraced areas.
On very steep slopes the remains of fragmentary material usually tends to roll downhill until stopped by less inclined areas or against irremovable obstacles encountered on the way. A substantial cluster of artifacts on surface point to a site, but the location of the cluster could be entirely secondary (i.e. moved downslope from its original location). In this case it is important to define the actual line of fall of the material.
The advantages of the contour technique consist of its systematic nature and reliability vis-à-vis the monumental remains present over the whole surface. Its limits consist of excessive steepness of the hillsides or heavy vegetation making some of the areas impassable and also monumental archaeological remains invisible.

Pathway technique
By following the traditional lines of communication criss-crossing the hillsides along the valleys it is possible to identify archaeological sites. Roads, paths, passes and dry stream beds or river banks represent lines of communication that may have remained unchanged for centuries. Nowadays they allow the local inhabitants to reach their homes, small villages, mountain tops and clean water sources just as they were used for similar purposes in the past.
This survey technique allows the work to be speeded up. In the space of a single day it is possible to cross whole valleys, encountering without too much effort (except perhaps physical) a succession of archaeological remains. Also in this case, however, the technique is effective only in indicating monumental evidence. It is possible to combine it with the transect technique in relatively flat areas free of heavy vegetation so as to detect the presence or ascertain the absence of non-monumental sites.

Local guidance
A fundamental help is given by the local inhabitants who, after lengthy conversations, often accompanied by tea and food prepared on the spot, may take us to explore completely unknown sites or areas now lacking historical evidence but which until only a few years before bore obvious traces of archaeological remains.

INTENSIVE TRANSECTS	Flat or gently sloping area (gradient < 20°)	• Complete and detailed	• Very slow • Useless for monumental evidence • Strongly conditioned by visibility • Possible only on gentle slopes (< 20°)
PATHWAY	Roads, paths, mountain passes, dry river beds, river banks	• Relatively fast • Combined with intensive transect survey	• Selective • Effective only for monumental evidence
CONTOUR	Hilly areas with steep sides (gradient between 20°-50°)	• Systematic • Complete • Combined with intensive transect survey	• Affected by environmental obstacles and ground morphology • Effective only for monumental evidence
LOCAL GUIDANCE	–	• Fast • Provides information on pre-existing state	• Unsystematic • Lack of control • Can be repetitive
PROBABILISTIC	E.g. marginal and relatively inaccessible areas	• Fast • Refers to relatively inaccessible areas	• Unsystematic • Effective only for monumental evidence

Table 2 – Principal techniques used in AMSV Project Phase One (2000-2007). (E. Morigi).

In such cases, it is endeavoured to exploit the information by carefully inspecting the areas searching for diagnostic elements of use in confirming the datum. In some cases the inhabitants may led us to areas in which important terracing work left only a few traces of a former archaeological site.
The drawbacks of this technique are that they lack a systematic approach and control. Also the information or the informers may turn out to be unreliable.
However, this technique is quite effective in identifying rock-art and rock-artifact sites.

Probabilistic technique
This is a type of non systematic survey aimed at exploring points on the landscape considered to be promising. This technique can be used only rarely and specifically in areas considered as marginal or inaccessible to the survey techniques described above. Slopes that are too steep (exceeding 50°) and inaccessible to normal human traffic may conserve sacred symbols such as rock reliefs or paintings along rugged and difficult terrains. Persistence will be sometimes thwarted and sometimes rewarded. Methodologically speaking, although this technique lacks plan-

ning and systematic implementation, it allows some light to be shed on areas that would otherwise remain concealed".

In any case, whatever the system or combination of methods chosen, the research basin needs to be clearly defined. A valley between its watersheds, its head and its mouth, is a coherent basin. An area of 25 sqkm. carved out of a plainland is much less so. In this case it may be decided to survey an area having a given radius with the centre represented by the site to excavate, or else an area corresponding to a modern administrative unit (a tahsil, for example). In any case the choice of area must be based on a clear perception. After defining the area, some basic maps must be procured, together with a minimum number of instruments and a survey form. You also need a notebook in which to record your first observations, even at the risk that this will gradually replace the survey form. A notebook is always essential as we shall see later with the excavation log.
It is not always possible to use a GPS, and indeed this is often explicitly banned in the excavation license. This is why good maps are necessary. The available General Survey of Pakistan maps are of excellent quality and definition and have a high toponomastic reliability. A second reason is that using them makes us familiar with the terrain, the place names, the orography, etc. Of course, if one has both a GPS and a digital map it is very convenient to immediately download the data onto the digital support: the simplicity of this operation exposes us to the risk of foregoing a more interactive and mediated knowledge. This is one of the secrets of the archaeologist's work, namely to obtain a three-dimensional view of reality, a view that is essential for any interpretation of the excavation which takes place precisely as the three-dimensional content (reality) is concealed from our eyes by the excavation. Another secret is not to carry out a survey seeking what you already know. In excavations this is hardly ever successful: you usually find what you were not looking for. If you wander over the countryside looking, for example, for black pottery, you will certainly miss other information.
Your backpack should always contain a pair of binoculars, a compass, a measuring tape and scale for photographs. Take with you at least one square metre of transparent plastic (polythene), of the type used by farmers for greenhouses, available in all rural

market places, as well as a set of indelible marker pens and a roll of tape, like that used by panel-beaters. If you need to document rock art, paintings, carvings, etc. arm yourself with patience. Many rock-art sites have been poorly reported by careless sketches and poor photographs. You have to trace everything throughout the layer of polythene fixed against the rock wall. Every now and then give your eyes a rest and lift up the sheet to get an overview and then start again. Never photograph these artefacts after re-tracing them with a chalk or, if you do so for the purpose of your study documentation, then cancel it all out. Do not use these photos for the purpose of publication.

The polythene sheets which you will have carefully marked with the site name and number, if hung up against white walls with a measuring stake may be photographed and reduced to scale on the computer to A4 format and graphically reproduced.

A number! This is an important point. Each identified site must have its own number as though it were an object. Give your survey a code and each site a number. For instance, AM 1-023, where AM is the survey code, 1 is the campaign number (you might carry out a second and a third one) and 023 is the site number followed by 024, etc. (three figures are enough as we assume you will not have more than 999 sites per season). The following year you will have the code AM 2-004, meaning site 004, season 2. Remember a basic fact: both in the survey, in the excavation and in the inventories, numbers are identifying names; they are assigned in serial fashion but do not have to be progressive; it is possible to have a series such as 5, 6, 8, 11, 12, 13, in which 7, 9, 10 have not been assigned or have been eliminated.

4. Preparing the excavation: budget and equipment

An archaeological excavation involves numerous persons and lasts quite a long time – from a season of two months to several seasons. The persons involved may be divided into the following groups: scientific team, workmen, technical and logistic support staff. An excavation must therefore be carefully planned. An important part of the planning is related to costs. These are divided up into budget units (see Table 3).

No.	Budget unit	sub-units			OWP activity
1	scientific team (per day)	allowance	board	lodging	A
2	representative (per day)	allowance	board	lodging	A
3	lodging				A
4	mobility	car rental	fuel	repairs	A
5	workmen (per day)	allowance	final premium		A
6	equipment				A
7	restoration work/materials				B, C
8	test laboratory				D
9	logistic staff (per month)	driver	administrator	watchmen	A, B
10	land leasing				C
11	publication costs				D

Table 3 – Example of an Operational Budget-Workplan slab.

Each budget, when drawn up properly and reflecting a detailed analysis of the real needs or costs, is both an operational work plan (OWP), that is, it reflects the activities planned to be carried out, and their distribution over time and at the same time. Every reliable OWP is also a reliable time plan or TP. Whenever the scientific objectives of the excavation are clear-cut and the expected results specified, the scientific team can draw up the two basic documents needed for a correct governance and planning of the work, namely the budget and the OWP-TP.
According to our OWP, the first activity to be addressed is the leasing of the land. Only rarely does an archaeologist find himself working on land belonging to the government, unless he/she is working on a site already acquired (and usually partly excavated). Only rarely is the land untilled. Except in these fortunate circumstances, the land is private property and represents an economic asset or an important sign of social prestige for the owner's family. Having identified the site and its approximate size (including the service area, and the area for soil dumping,

OWP activity	Budget unit	Description	Months								
			1	2	3	4	5	6	7	8	9
A	1	survey									
	1	excavation									
	2										
	3										
	4										
	5										
	6										
	9										
B	7	restoration									
C	10	site management									
D	8	study									
	11	publication									

Table 4 – Example of a Time Plan.

access, parking and the hut for the tools and watchmen) an economic agreement has to be negotiated with the owner. Let us assume we have reached such an agreement and that the cost is covered by the available budget (a hypothesis that must be verified months beforehand). The agreement must be drawn up on legal paper and deposited at the nearest law court (an operation that costs a few hundred rupees). It is good practice for the agreement to include a tacit renewal option and to cover an area at least twice the size of that which it is intended to excavate. The excavation always reserves some surprises and it is not possible to know in advance the extent and the length of time the excavation will have to be extended. Moreover, a lot of space around it will be required, as mentioned above.

The workmen are usually hired from among the labourers and farmhands working on the same land that has been rented or in any case are drawn from the local village; the watchmen, who may also be workmen, are often relatives of the owner. These two aspects will facilitate negotiations with the owner for obvious reasons of a return on his asset but will also be useful to you as they facilitate the process of fidelization through work which must always be obtained as far as the local community is concerned also with regard to the protection of the site. It is a good idea to negotiate pay with the owner and in any case it should never be much in excess of the local daily pay offered to farm workers. This will head off any conflicts and/or claims that could jeopardize the work. The agreed conditions must satisfy everyone. It is also necessary to ensure that the daily working hours

on site do not exceed six hours to avoid loss of concentration and data, while the farm labourer normally works 8 to 10 hours per day.
The equipment required for the excavation must include the following:

1) picks (one for each two workmen)
2) long-handled shovels (one for each two workmen)
3) wheel-barrows (one for each two workmen)
4) small picks (one for each two workmen)
5) large trowels (one for each two workmen)
6) small trowels (one for each two workmen)
7) baskets (start of with 100 baskets per 10 workmen)
8) large and small brushes
9) ladders (at least two)
10) plastic bags of various sizes, aluminium foil, tape, felt-tipped pens.
11) labels to be wired to the baskets (and wire precut into approximately 15 cm lengths)
12) sieves.

The wicker basket is an essential tool that has three uses: to take away the soil and smaller stones (also using a line of workmen – one every 1.50 metres, also standing on ladders: the baskets are actually light and do not add much weight), to collect archaeological material and to store the materials in the storerooms.
In addition to this material we have wooden planks to allow the wheelbarrows and workmen to avoid passing over the excavated areas or recently cleaned layers: every effort must be made to avoid contamination and always to work tidily!
All the equipment is available on the market in every large rural centre. In some cases small-size picks and trowels may be hard to find. It is possible to find a blacksmith who can make them or modify them in accordance with the model proposed on the page opposite. In any case every two-three weeks, in rotation, the material needs to be resharpened by a blacksmith (the cost of this must be budgeted for in the equipment cost section). A good number of handles for the picks should always be kept in reserve. Plastic bags (the ziplock type is ideal) and a couple of rolls of

aluminium foil can be used to collect the more delicate samples and finds; the cards are used to label the baskets of material; the felt-tip pens and copying pencils (which do not fade even when exposed to sun and rain) are used respectively to mark the envelopes and the labelling cards.
The equipment of the scientific team must include:

1) optical level and stadia
2) site ranging rods (at least 10)
3) 50 mt measuring tape
4) two 20 mt measuring tapes
5) three to five 10 mt measuring tapes or an equivalent number of folding rulers
6) plumb line
7) blackboard and chalk
8) metric scale and North pointer
9) nails and pickets (respectively 100, large, and 20-50: obtained by cutting reinforced concrete rods into 80 cm segments)
10) heavy duty building site string
11) compass
12) two bubble levels
13) a square frame with a 10/20 cm grid, for graphic designer's documentation

Of course each team member will have a large trowel, a small one, a small pick, excavation log, pencil, pen, ruler, eraser and pencil sharpener (as at school), as well as his/her own camera.
It is important that the excavation photos are downloaded daily into the computer and stored in dated folders. A backup copy in external storage units must be made without deleting the camera memory. For the purpose of publication it is useful to record the name of the person who took the various photos. The photos may be marked with the author's initials (as in the last column of the Inventory reproduced in Table 1) and a serial number running till the end of the excavation (larger project will hire professional photographs and persons in charge of photographic archive).
Before ending this short chapter, a few words about the motor vehicle. The most suitable excavation vehicle is a double-cabin 4WD pick-up: this vehicle can accommodate up to six persons plus the driver and the platform can be used to transport a load

of baskets from the excavation. Returning to our lodgings: we need a room, possibly on the ground floor, with an outside space and a storeroom. These spaces will be used for the various operations of cleaning, cataloguing and restoration which cannot be performed in a hotel or an apartment. These requirements need to be taken into account in advance when we are seeking suitable lodgings for our team.

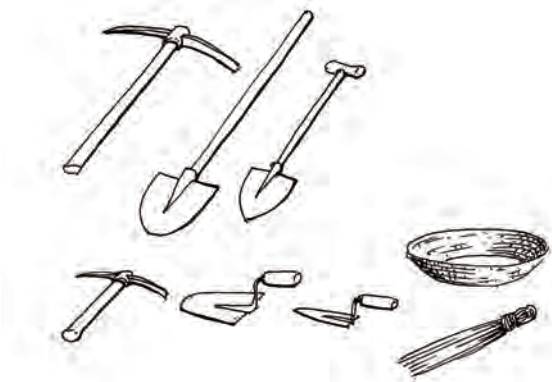


Fig. 2 - Excavations tools: pick, shovel, small pick, large and small trowels, basket, brush.

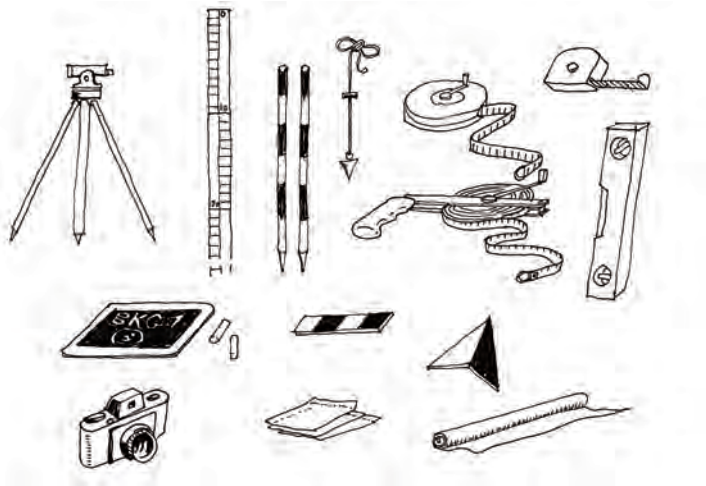


Fig. 3 - Equipments: optical level, stadia, rods, plumb line, measuring tapes, bubble level, etc..

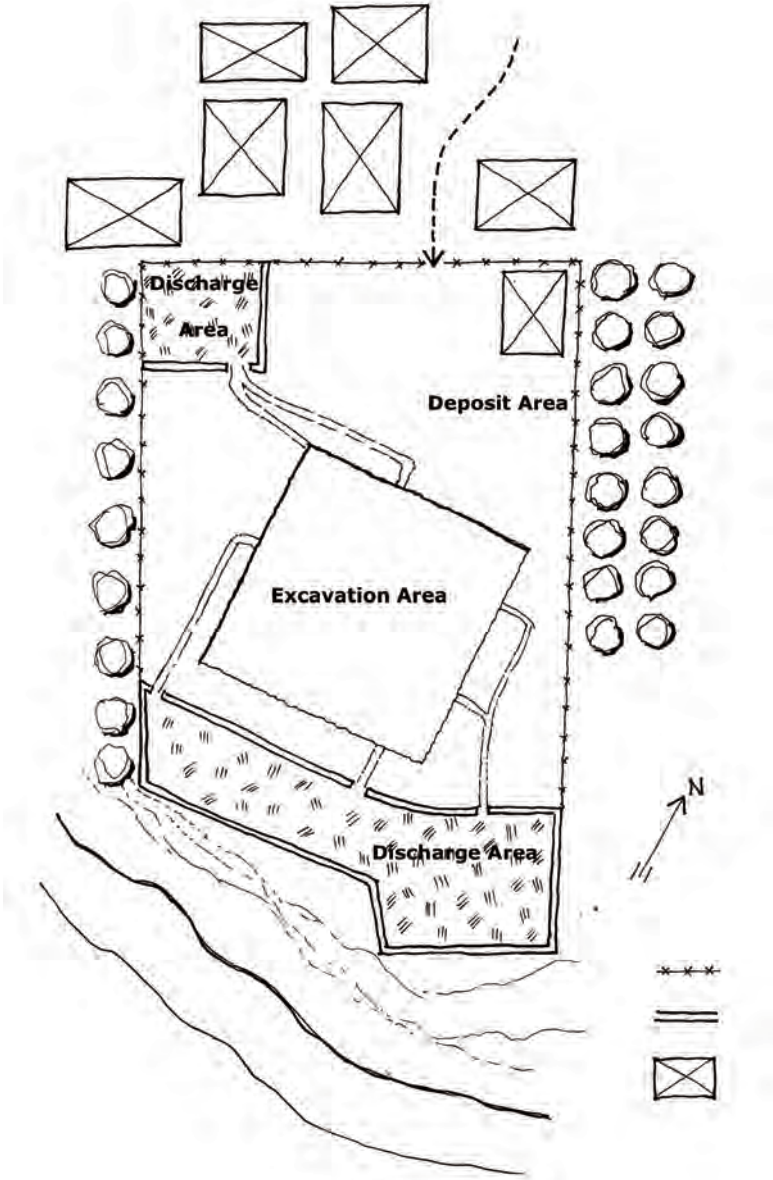


Fig. 4 - Layout of an ideal excavation area.

5. Beginning the excavation: laying out the trench

As we have seen, a portion of land is selected which is larger than that we have initially decided to excavate. The next step is to select the area to excavate, the deposit area, the discharge area and the access area. The deposit area is normally located before the excavation area and the discharge area after it. This establishes a sense of order for those doing the work, which has quite an important influence on the way the work is daily carried out on the site.

The first operation is to fence off the leased area: the excavation is a place of work that is both delicate and dangerous and it is certainly desirable to avoid accidents. You might have to pay for a lame cow but also seeing a freshly excavated 2nd millennium occupation level ruined by holes dug by stray dogs.

After fencing off the area, an access path to the discharge area is set out. It must be wide enough to allow the two-way passage of wheelbarrows, which will be full in one direction and empty in the other. The third operation to be performed (we have already hired a number of workmen, let us say one quarter of the total) is to build a hut for storing the tools and as a shelter for the watchmen. At the beginning, two watchmen will be enough although three will ultimately be the minimum number to ensure a proper shift. You have to decide whether to hire the watchmen from among the workmen or else from among the older farm labourers of the owner. In any case it is good practice to agree upon their names with the owner and that those selected should live in the vicinity of the excavation. This will make everything simpler.

Local practices should be followed for making the enclosure and the minor constructions. You should try to discover those among your workmen, all expert labourers, who are more skillful masons. This will be taken into account when you form the working teams later on.

Having defined these spaces, the trench can now be laid out: it is traced and staked out and the datum level set. Then the entire surface is surveyed and mapped. In short, the plan of level (1) is made = surface.

In setting the trench limits it is necessary to keep a proper distance from the deposit and discharge areas equal to at least one

tenth of the maximum trench size. Mark out an excavation area that is as large as possible. If possible, avoid long narrow trenches, which are however ideal for exploring an internal-external situation, for instance across the walls of a fortified site. The wider the trench, the clearer its stratigraphy will be. Many archaeologists have a sense of security in narrow spaces but this is an illusion. Imagine a manuscript or the page of a book (fig. 5). Imagine that your study of that page is limited by a strip running across the entire page. What would you be able to understand? However, this is a matter of choice.

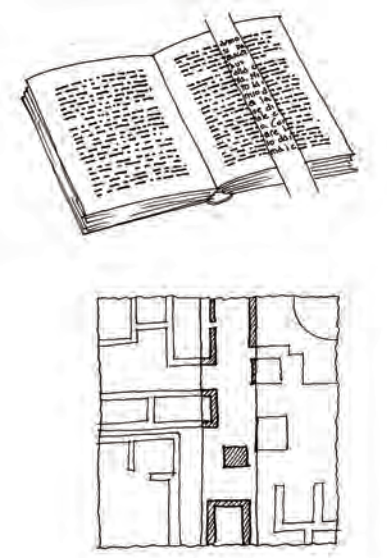


Fig. 5 - Narrow trench vs. wide trench.

Our methodological approach follows the current models of stratigraphic excavation and considers the grid system to have been superseded. This will be illustrated below. In any case, it is crucial for our trench or excavation area to be perfectly delimited, aligned with the North, if possible with equal side lengths (even) that can easily be subdivided. Between having a trench measuring 17x15 m and one measuring 16x14 m or 18x16 m there is apparently not much difference. At the practical level however there is a big difference. A trench can be orientated any way you want. However, if possible orientate it towards the North and you will facilitate the observation, description and graphic representation of any structure or artefact.

To delimit the area start from the highest point and position the optical level on its tripod with the centre of the instrument perpendicular over the point you have chosen as your datum point which we shall call point A. This point is marked permanently with a stake cemented into the ground. Previously the archaeologist would have used a simple instrument, the surveyor's com-

pass, which nowadays has been replaced by the optical level. From point A, turning the knob on the instrument, take a sighting on point B in the same alignment. How is this alignment found? How is the knob used? You have a compass and are standing on point A, take a sighting, in a W direction, for instance. Turn the head of the instrument in that direction. Place the compass on the head of the instrument in alignment with the sighting and move the head until it is aimed towards the W: a precision of degree seconds is not required: this is an operation that corrects itself as you proceed.

Now use your thumb to turn the horizontal circle rotation ring under the head of the instrument until it displays 0°.

Fix it in this position: when you then turn the head of the instrument towards the S (check using the compass); the notch of the instrument head should indicate 90° (or 100°, see below).

With the instrument on point A you can also take the height: very simply (and empirically) this is the height of the instrument above the point. From where to where? From half way along the telescope to the ground surface: this will be the height of the level that will be used for the other levels throughout the day.

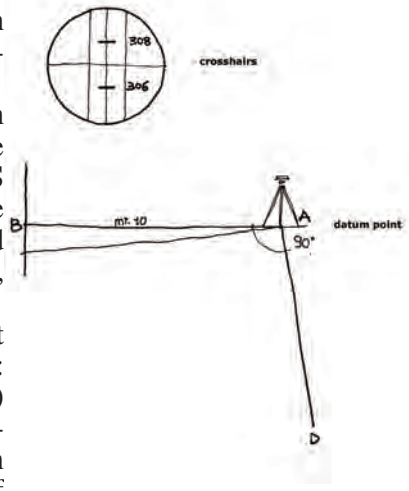


Fig. 6 - The optical level and its crosshairs.

Let us go back to the W alignment. If you have decided to dig a 10x10 m trench (rather small for my tastes but this is only an example), your colleagues will position the stakes or the rods on the alignment read off with the instrument and others will pull the measuring tape from 0.00 = point A to 10.00 = point B. It is importantant for the tape to be horizontal, which can be checked using a building site bubble level. You can also check also the distance by calculating the difference between the reading of upper mark and that of the lower mark of the crosshairs. After that multiply by 100 and add a costant of 10 cm (example: upper

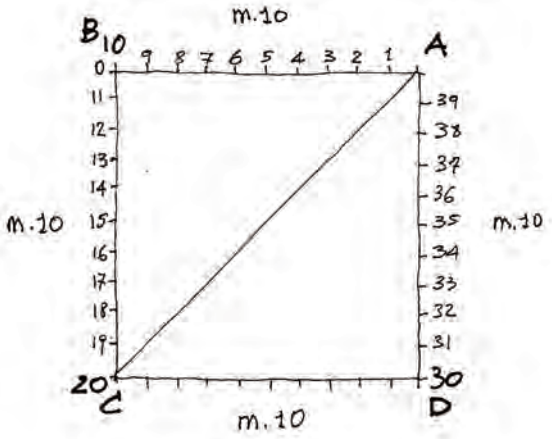


Fig. 7 - Mesured grid of an excavation area.

line reading: 3.08; lower line reading 3.06 = difference 0.02x100 = 2 m+10 cm = 2.1 m) (see Fig. 6). After finding point B, position the rod and survey it: that is, using the instrument read off the difference in level between B and A, which will be negative because, as we know, point A is higher (the details of this operation will be illustrated later). After fixing point B, then turn the instrument 90° in a S direction and using the same system fix and survey point D. Then, in order to fix point C you have two options. Option one: move the whole instrument with its tripod from A to B, take a sighting on A in order to set the knob on 0° and then shift by 90° in order to define C.

Option two, which is more empirical but geometrically correct and to be used if you have three measuring tapes and your trench is square (if it is rectangular the formula is just a bit more complex). If AB is 10 m, you find the diagonal AC in this way: 10x1.41 (a constant) = 14.1. Now, two members of the team will measure 10 m from B in the direction of C, two others from D towards C, two will measure 14.1 m from A towards C. The point at which the tapes of the three measures cross will without doubt be point C. At this point, having fixed the stake, you can directly survey from point zero (A).

Confirmation of the orthogonality of the four points A, B, C and D can be obtained rapidly by means of two options. The first is trickier: the instrument must be moved from A to B and the knob

set to 0°, sight A, then turn the instrument and sight C: the knob should display 90°; repeat the operation from D, taking a sighting on C and then A. *Many instruments (for example those of Nikon) have a rotation ring divided not into 360° but into 400° (centesimal degrees or gons): in this case the right angle (B-A-D, C-B-A, etc.) will have a value of 100° and not 90°.*
The second option is geometric: check the diagonals. If necessary shift the stakes (but not A) until the total approximation is acceptable (out of 10 m. I would say less than 5 cm: sometimes an underground stone is enough to shift a stake you are driving in by 2-3 cm). Once you are certain, cement also the other three stakes (B, C and D). After this drive in the intermediate stakes (long nails will do the job) at a distance of 1 m on each side. In this way on the planimetric sketch you make on your (e.g.) 1:50 scale millimetric graph paper (1 metre = 2 cm) a square having a side length of 20 cm subdivided into 10 marks per side every 2 cm, marked out as follows: A1 (= datum point), A2, A3, A4, etc., B1 (= B), B2, B3, etc. now the area is ready for the first operation: the surveying of the points along the side and the surface of the layer (1). Start from the sides or the profile (Figs. 8-9).
Taking the elevations is a simple operation which only needs a bit of practice. Learn how to do it propertly as you will have to repeat it several times a day; it is the basic operation in the documentation of the excavation. Set the instrument up on point A (the datum point). Place the instrument on tripod, at right angles to the plane of the point underneath (bubble level). To verify the level turn the head of the instrument in various directions and check the bubble. If necessary make any necessary adjustment using the three levelling screws at the base of the head. The height of the instrument can be taken from the base of the point to the middle of the telescope tube (the best way in my experience): if it is not marked, mark it yourself with the indelible felt-tip pen and use it always. As we have seen this will be the daily reading which you will enter in the excavation log. On this day the instrument stands +1.70 m with respect to point A (datum point, which has a relative height of +0.00 m). Find a workman to be trained in this activity (this is an excellent opportunity: always view the excavation as a training experience); he will be the one who will learn to level the instrument every morning as the first operation to perform when the excavation is opened. He will take

the stadia to the point to be surveyed. Start from the intermediate points on the side A-B (including B), then B-C, C-D, and lastly D-A. Now you are at point A1. The stadia will be held from behind and placed in a vertical position: the rods are sometimes equipped with a bubble that can however mark the vertical with

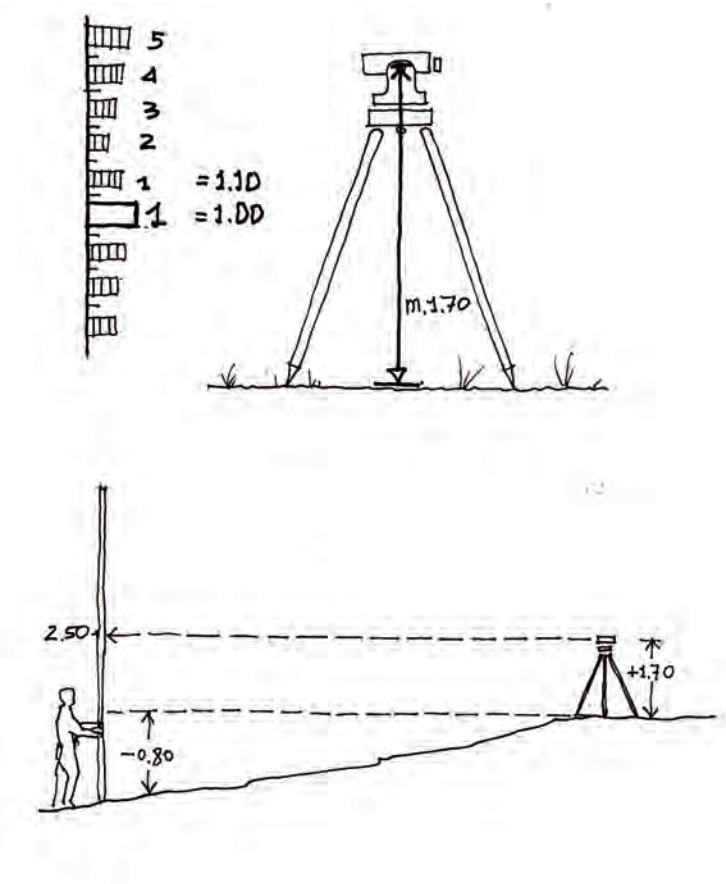


Fig. 8 - Surveying process: how to read the stadia.

respect to the forward-back direction; communicate verbally if through the instrument you see that the stadia is sloping right or the left. Now take a reading through the lens at the centre of the crosshairs. Let us assume that the instrument reads 2.50 m above

the datum point. This means that A1 is situated -0.80 m below point A (datum point) (see Fig. 8).
This is because the relative height on the ground is equal to: stadia reading - height of the instrument, i.e. 2.50 - 1.70 = 0.80 (-0.80 below A).
Repeat this surveying operation for all the points and mark the the reading on your 1:50 map; you can perform all the calculations at home in the afternoon. Through this operation you can graphically reconstruct the profile of the excavation area, side by side. *Of course*, we repeat for the last time, *all the profiles will be decreasing with respect to point A which must be the highest point*. Now you define a series of points inside the trench, e.g. four rows every two metres from AB to CD. This is the case if there are no increases in level or mounds. Otherwise they will have to be multisurveyed as they may represent the covered top of underlying structures. In this case you have also to sketch the shape and position on your 1:50 planimetric map. The technique for doing this will be illustrated in Chapter 11.

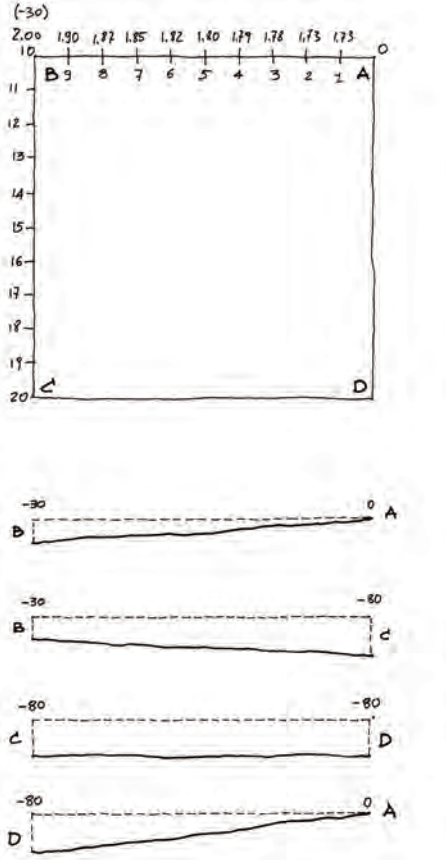


Fig. 9 - Side profiles of an excavation area.

6. Excavation technique and site organization

Archaeological excavation is a complex operation. Like all complex operations it can be simplified with the help of proper organization. All organization becomes simpler if the persons involved participate in the various phases and the internal logic. In this sense it is extremely important for all the staff involved to participate at different levels regarding the significance of what is being done. In short, it may be said that every well organized excavation can act as a training camp, and at the end of the excavation all the subjects involved will be better informed than they were at the beginning of the work.
If this training is extended to the workmen, and the latter come from the same community as the land on which the excavation area is situated and from which also the site watchmen come, the positive knock in terms of awareness are multiplied. A site that is "understood" at the local level will be better defended against the threats typically affecting every archaeological site: illegal digs, vandalism, neglect, encroachments, and sometimes lack of interest by the local administration. Besides, archaeological excavation attracts employment to the community, and archaeology can make a direct contribution to the local economy by means of a series of excavation seasons in the same area. A properly maintained site attracts visitors; tourism is a form of direct support to the local economy. In other words, an archaeological excavation can have a huge impact in educational, social and economic terms, beyond what the archaeologist himself is capable of imagining. However, one must be ready and aim at obtaining this result, in addition to the scientific results, and so it is necessary to prepare everything before and during the excavation work, above all by training the local staff.
Organization of work must be clear and well-defined, with simple shared rules. Excavation is a delicate and potentially dangerous activity carried on by a number of persons in a restricted space, using potentially dangerous tools, often with only limited available time. Above all, order is necessary. Order starts with the working hours.
6 hours of work is an optimal length of time to avoid losing concentration and to perform a good amount of work. Work starts at dawn, between 5 and 7 o'clock, depending on the time of year

and the latitude, and the first action is to call the roll of the workmen and hand out the tools. In agreement with the landowner and according to the assessments you have made, we have already selected the foremen, say one every 20 workmen, to whom the following tasks will be assigned: roll call, handing out tools, checking the tools handed in at the end of the day's work, maintenance of the wheelbarrows and tools (removing soil and washing them at the end of every day; the tools are soaked in kerosene each weekend and sharpened regularly). As far as the roll call is concerned, the fact of delegating it to others does not prevent you from get to know each workman and addressing him by name and thus increasing team spirit. One or more workmen can be chosen for measurement operations (setting up the optical level, using the surveyor's rod and helping make the measurements using the tape measure and plumb line) and for the photographs (setting up the blackboard, removal of tools and baskets from the area, etc.). A group of workmen with mason's skills or experience in mixing (lime) mortar and cement will be deployed to construct retaining walls, drains, do minor restoration work, etc.

For example, a team of 40 workmen will have perhaps 2 foremen, 2 technical assistants and 5 masons. They will all do the digging work but it must be possible to delegate them to coordinate or perform other more specific activities.

Let us go back to the beginning. After calling the roll the tools are handed out and the workmen move to the working area. Three hours after the beginning there will be a 15 minute break after which the work is resumed until the end of the day. Half an hour before the end of the working day all the excavation activities are interrupted and the cleaning operations begin. All the excavated soil must be removed, the ground surfaces and the razed surface of the walls, as well as the wheelbarrow tracks inside the excavation must be cleaned using trowels, together with the edges of the trench. After handing in the tools, the workmen will carry the baskets containing the materials to the vehicle and leave the site. The next time they meet will be the next day unless there are urgent reasons for opening up the site in the afternoon. The clean up prior to closing is a very important operation: if it rains or is windy the unremoved soil will be scattered everywhere and will spoil the part already excavated. Early in the morning you have the best conditions for taking photos of the

excavation (no shadows, diffuse light). The next morning you will resume the excavation and that the situation must be clear to your eyes and to those of the workmen.
The philosophy of the excavation, i.e. the theoretical basis underlying the stratigraphic excavation (the scientifically based archaeological excavation), can be summed up in the following proposition.
The excavation proceeds with the removal of the results of a process that is the reverse of the order of deposit. To each element (layer, wall, pit, etc.) is given a number.
Let us take an example. Let us imagine (since imagination is part of the process, I decided not to illustrate the example) a dining room with a table laid with plates, forks and glasses, a couple of overturned flower pots on which someone has laid a jacket and on top a pen. Supposing we were to "excavate" this situation layer by layer, that is, by deposition phases, in the reverse order, we would first have to remove the pen (1) which lies physically on top of the jacket (2). The jacket (2) lies on top of a plate, which stands on a flat plate, which stands on a tablecloth covering the table, which stands on a carpet that covers the floor. But after you have removed (2) and exposed the whole situation it will be clear that before (2) was placed on the plate (a fact that indicates a probable phase of "abandonment": you don't leave a jacket on a plate), the two flower vases (3)-(4) had fallen. The latter must be removed before removing the plates (5)-(6)-(7)-(8), the flat plates (9)-(10)-(11)-(12), the forks (13)-(14)-(15)-(16) and the glasses (17)-(18)-(19)-(20), the tablecloth (21), the under table cloth (22), the table (23), the carpet (24), and you ultimately reach the floor surface (25).
The sequence thus obtained can be illustrated using the socalled "Harris matrix", named after its inventor, the archaeologist Edward C. Harris (see Appendix *d*), and subdivided into contemporary actions or periods (denoted as "structural periods" in the excavation) (see Fig. 10). According to our matrix, in Period I was constructed the floor plane (which did not necessarily involve a carpet), in Period II a carpet was laid down, in Period III a table was added (which was evidently not laid), in Period IV the table was laid and decorated with two flower vases, in Period V the vases fell over (a natural or deliberate event?) and nothing suggests that the meal was served and eaten (let us imag-

ine a sub-Period Vb of temporary abandonment?). Lastly, in Period VI someone left a jacket with a pen and the area was abandoned definitively.
These structural periods do not correspond to an equivalent number of cultural phases. Let us interpret this situation. We can provisionally group together Periods II-IV in the same cultural phase, also because the carpet, table, plates and forks refer to the same macro-action or macro-phase: the room has been organized

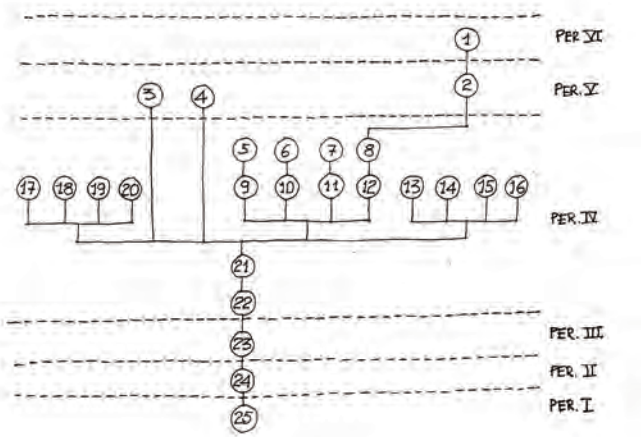


Fig. 10 - Digging up our dining table. Physical matrix and Periods.

in view of a meal. Likewise it will be important to know when the jacket and the pen were made as this will provide chronological information on the phases of abandonment.
Let us suppose that the jacket was made in 1985: this allows us to say that the table was set before 1985, and so 1985 is the *terminus ante quem* (Latin: in archaeology indicates the moment before which an event occurred). However, under one leg of the table we find a coin from 1962: this find does not date Periods II-IV to 1962, although it tells us that the table was set after 1962, and so 1962 is the *terminus post quem* (Latin: in archaeology indicates the moment after which an event occurred). So nothing could have been done prior to this date. Periods II-IV lie between 1962 and 1985. When exactly? In the absence of organic remains that would allow a 14C dating we cannot know this from a study

of the materials, although with one reservation. If for the sake of hypothesis the dinner service had been inherited and had been produced in 1905-1915, we would have to thank the 1962 coin and the 1985 jacket which would be key elements capable of bringing the chronology forward.
We are lucky because a further study allows us to determine that the under table cloth is a synthetic product of the 1970s (whereas the linen table cloth is older, from the 1940s) and the flower vases are clearly a porcelain product manufactured in the 1980s. In this way we begin to understand the co-presence of objects from different periods of the same macro-phase: the latest object is what counts, not the oldest one.
Reconstruction: the table was set between 1980 and 1985 using also quality material dating to previous years and preserved; the table was abandoned some time after 1985. The 1962 keeps its quality of *terminus post quem* notwithstanding the presence of earlier objects, as they are physically associated to later periods. But also the coin is associated to later objects. How that can be explained? This is a good question. 100 coins from British India would allow us to date the levels with certainty unless we are excavating the home of a coin collector. Coins actually have a long life (even if they are no longer in circulation they still have their metal value) and are often lost as they are small objects subject to constant movement. As far as the first point is concerned, here is a personal example: one day at Chicago airport I was given a 1929 penny in some change. My curiosity was aroused and I began to collect pennies in order to find those ante-1960 and I was able to verify that in the space of about three months 10% of the pennies I received belonged to a period between 1909 and 1958 and they were still in circulation in 2012! What value would they have for a future archaeologist?
Another possibility: are we sure we have not made a mistake? Errors are constantly being made: did that coin come from a sure layer? If we are sure no errors were made, there might be other explanations. During the excavation we will constantly be finding holes made by rodents, cavities left by tree roots, filled with percolated or downward filtering material, from more recent layers to older layers. Vice versa trees can be uprooted and thus bring to the surface older objects and fix them in that position when the sun dries the soil (or post-depositional process).

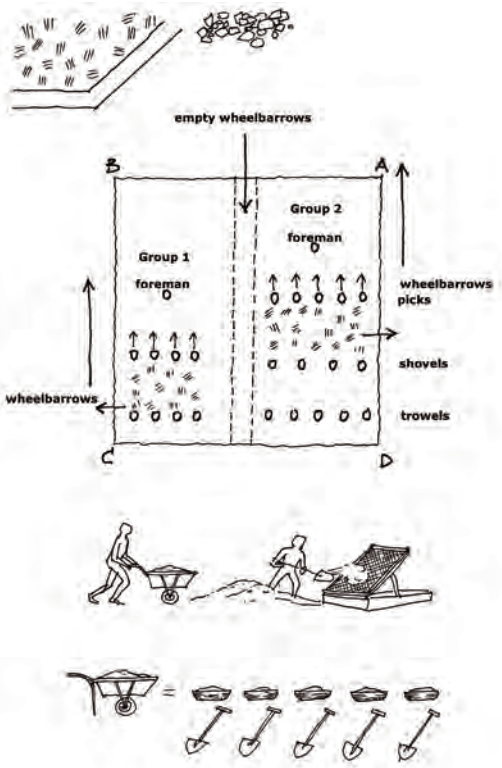


Fig. 11 - Organization of the excavation trench. 1.

Once the "philosophy" of the stratigraphic excavation has been understood, only a well-ordered working method can partially prevent us making mistakes. Just as the site must be well-ordered so must the excavation process.

Let us return to our team of workmen. In the early stages the workmen will be busy in removing the surface layer (farmland or untilled land). Picks and shovels can be used; the objects found will be a mixture of recent and ancient, the latter sporadic or erratic, and in any case not chronologically reliable even though they may be indicative of what we can expect to find at a deeper level or in the vicinity (the objects have been transported or uncovered by rain, removed by tractors, exposed during earth moving, etc.) The work with the picks must take this

into account; the workmen must be lined up; in front of them the foreman will observe the land and collect the material in a basket; he will follow the work of the wheelbarrows. Behind the pick workers the shovel workers will remove the soil; at the sides the wheelbarrows will come and go, taking away the soil debris. The stones will be taken away in wheelbarrows or baskets and dumped on one side; they will be used in restoration work and for masonry. Workmen will move forward as they work. Behind the shovellers, a team of workmen will clean the ground with large trowels. If two working groups are used a passageway will be left in the middle. Before the soil is definitively discharged a sieving area can be set up.

How full can a wheelbarrow be? A maximum of 5-7 shovel fulls or 5-7 large baskets of soil. Rotate the workmen during this phase: one hour working with a pick and one hour with a trowel, one hour with a shovel, one hour with a wheelbarrow. This will reduce fatigue, contribute to the diffusion of manual techniques and distribute physical effort and will give you a chance to appreciate those who best handles the various tools.

Once the surface layer (1) has been removed and all the objects found are placed in baskets, marking the excavation, the layer and the date, a collapse layer, for example, covering the entire area (2) is laid bare. This is described on the SU form (Fig. 24) and/or in the excavation log (I prefer the second option, also because this way you have the previous situation constantly at hand), and then (2) has to be surveyed, mapped and photographed (see Chapters 5 and 11). The photo is taken with the area perfectly clean with a small blackboard identifying the excavation, layer and date, with a metric scale and the arrows indicating N (Fig. 22). After performing these four operations (according to following order: photo, description, mapping, surveying), fresh baskets are prepared with a new indication of the layer and excavation begins. Removal of the collapsed stone debris will reveal the top of the first structures. At this point it is advisable to leave a space for transversal access: in this way our trench will be divided into 4 sectors measuring about 4.5x4.5 m and denoted as NW, NE, SE and SW. At this point the work changes radically (Figs. 12-13).

In the first place, number the rooms: use the same system as that used in the initial survey: 001 will be room 1, excavated in the

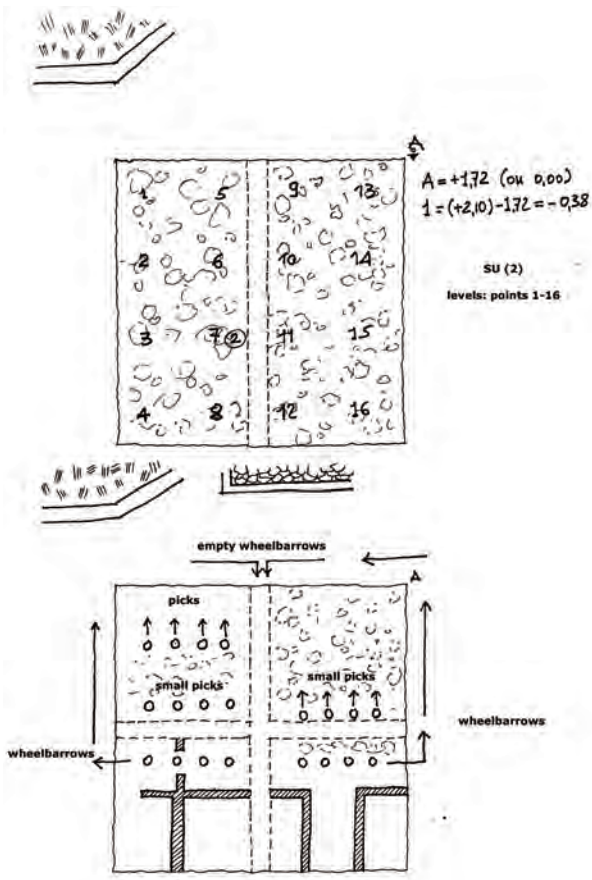


Fig. 12 - Organization of the excavation trench. 2.

first campaign; from the second campaign you will start from 100. The number of layers will be enclosed in a circle: (1); the numbers of the wall units inside square brackets: [5], negative units (holes - but not their filling - razed surface of walls, etc.) between triangles <7>. When you write the excavation report these forms will be replaced by different brackets (as above).
After removing (2) it will not be possible to excavate all the rooms simultaneously. It will be important to proceed by visible phases, that is, not to dig down to 3 m in one room to reach the

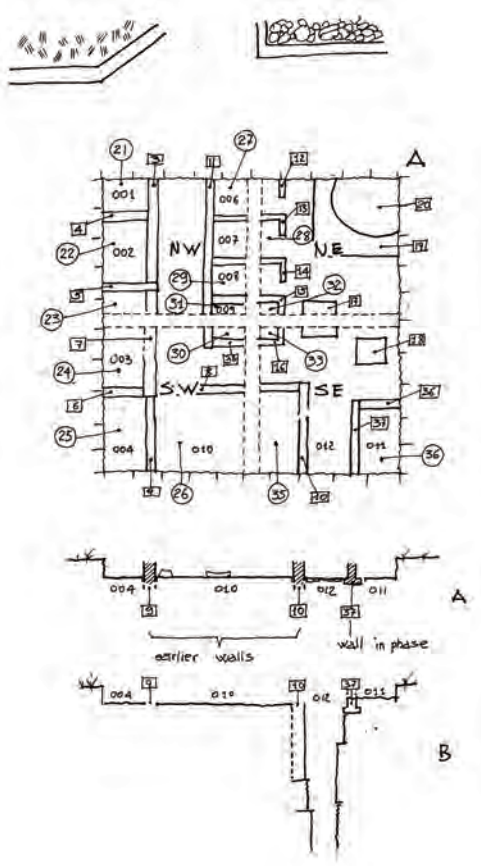


Fig. 13 - The situation after removing SU (2).
Below: deep digging vs. horizontal excavation.

wall foundations while in another you dig to a shallower depth thus by chance creating an incomprehensible situation for yourself and the workmen. Proceed in an orderly fashion, gradually exposing the same structural phase in the whole area, in all the rooms. As an expert workman said one day, "page after page, the excavation is read like a book".

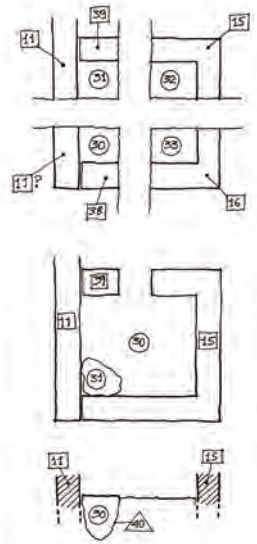
Fig. 13 is meant to explain this concept more graphically. In the first case (A) you will see that the later phase is composed of open and closed rooms, courtyards-kitchens and passage ways

that make partial use of earlier walls ([9] and [10]) and partially new structures (contemporary, like [37]). In the second case (B) all you know is that room 012 in the earliest phases was different, narrower, increasingly narrow and you have no information; you have only taken a core sample and gathered a sequence of materials. If this was what you were after…

Room 012 will be 012 only as long as the limits of 012 are respected. In this phase 012 is a street but underneath we will have a closed or open room but not street 012 which is such and will have this number only in this phase.

After removing (2) a network of structures appears. Number the walls and their razed surfaces (negative units): at each section of wall, a wall can be formed by several masonry sections or units. Wall [11] differs from [38] because they are contiguous but separate. [38], [16], [15] and [39] could be just one wall (= a single number), or not; we will know only when the baulk used as a passage has been removed. The same is true for layers (31), (32), (33) and (30), which, until proved otherwise, are numbered separately.

Indeed, after removing the baulks it might be discovered that [39] and [15] are different and that [15], [16] and [38] are one and the same wall [15] (the other two numbers have been eliminated and not reused), and that layers (30)-(33) are actually (30) cut by filling (31) and the pit <40>. All the rooms have been given a a number and so from now on this information will be added to the information card: area, room, layer, date (Fig. 14).



The tools and organization now change: you will form smaller teams; one group of workmen will work with small picks and small and large trowels, each accompanied by an assistant with a basket and trowel. When possible, the excavation is performed working backwards so that the excavated part is left clean.

Of course, as the excavation proceeds, the network of structures will be plotted and before excavating each single layer, it will be described, surveyed, photographed and thus given a number for the card (attached to the basket/s).
How to treat the holes left by illegal diggers (which (31)-<40> will prove to be), the structures, the planes and all the aspects of the graphic documentation will be explained in the following Chapters.

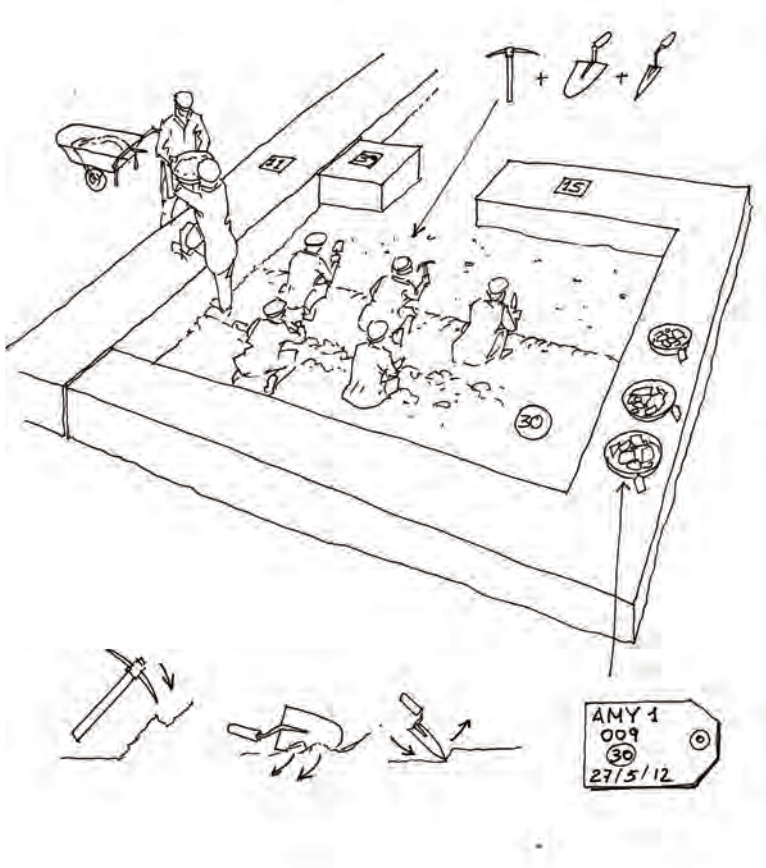


Fig 15 - Organization of the excavation trench. 3.

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Fig. 14 - The horizontal stratigraphy before and after removing the baulks.

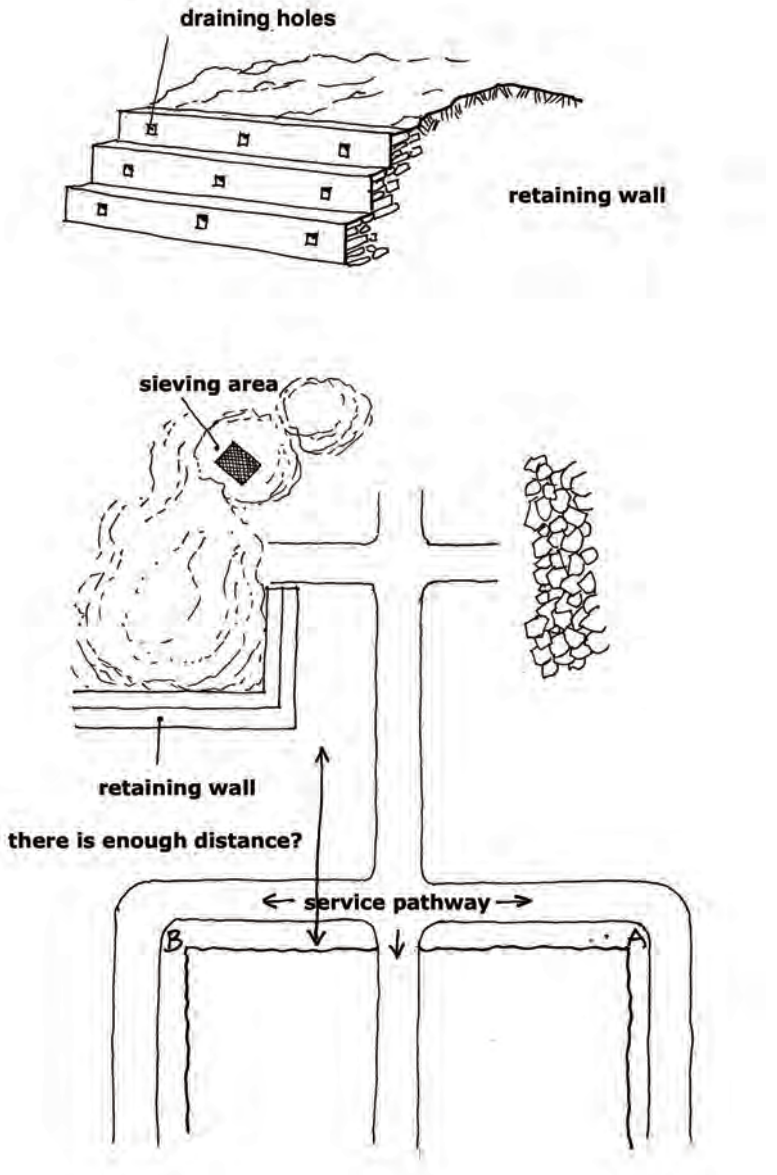

Fig. 16 - How to deal with aggregare soil and stones.

7. The problem of excavated soil and aggregate material

Before going on to further analyse the excavation and documentation operations, I feel it would be useful to include three short chapters on several preliminary operations involved in the excavation. *Repetita iuvant* (Latin: "repetition is useful"): the excavation is a complex and dedicated operation to be carried out in an orderly fashion. You have only six hours in each working day. If whenever you have to take a photo or do some surveying you have to interrupt the work, the excavation and the work rate will be affected. Too many interruptions will sap the progress of the work. Let us imagine a sports match being interrupted for 10 minutes every 20 minutes or so. Unless we are playing cricket, when play resumes the players will have lost concentration, are distracted, slower, less reactive. What can you do during the frequent pauses in the excavation? If you were the coach of a sports team you could do warm-up activities; in an excavation you bring in "secondary works", for instance cleaning up other rooms (with small trowels and brushes), or the clean-up of trench edges (with large trowels), the tidying up of excavated soil, the construction of small drains and restoration and conservation activities.
The orderly disposal of the soil is an important aspect of the excavation organization. For every cubic metre of compact soil excavated you will have much more than a cubic metre of loose earth to be disposed of (excavated earth grows in volume). The spoil must be stored in the discharge areas. But you cannot just leave your mound of soil to accumulate in a disorderly fashion. In the case of rain or strong winds you will again find this soil back in the excavated area and then you will have a tough problem to solve. The discharge area must be clearly delimited and contained by walls which must be stepped so as to reduce the weight of the soil (especially after heavy rain). You thus have to set up a large and easily accessible entrance area and a sieving area. If you want to sieve the soil (a necessary step in some circumstances) a proper shelter should be arranged.
The containing walls will be made of excavated stones which, above all in the excavation of settlement areas, represent a significant part of the excavated material.The stones not used will be useful for conservative restoration work which will be gradually carried out to make the site clearer and safer.

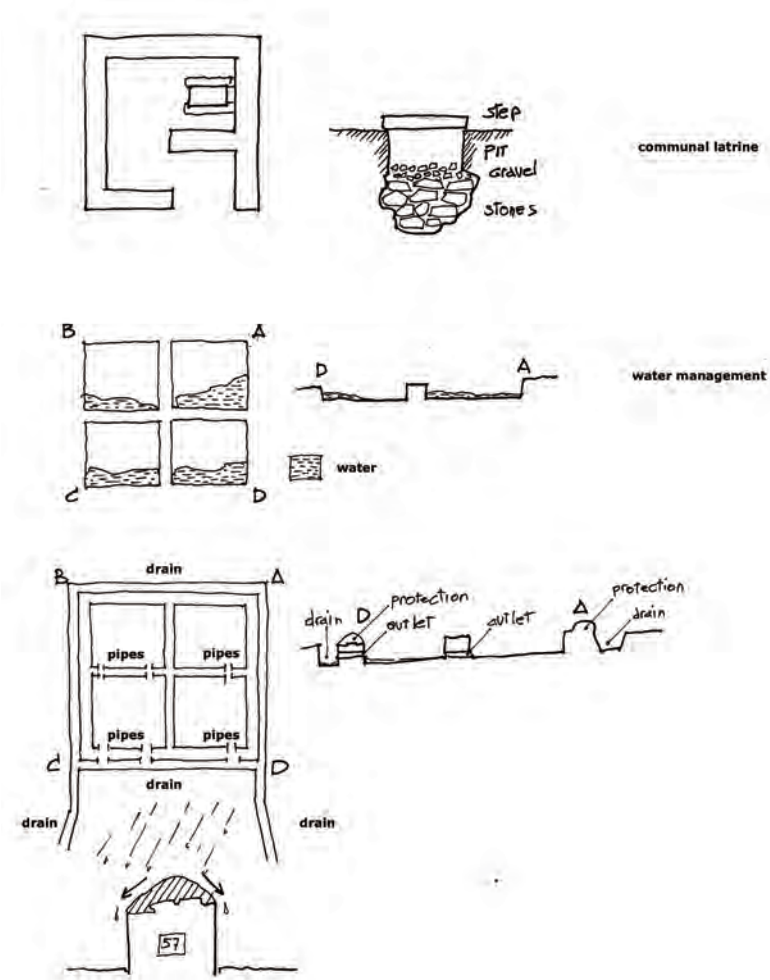

Fig. 17 - How to deal with the problems caused by heavy rains.

8. Water management and protecting the artefacts

Among the various secondary activities do not forget to set up one or two latrines at the back of the discharge area in a place that is in any case suited to this purpose. A field latrine is essentially a small unroofed area closed by an out-of-axis entrance and a loose rubble drain. The cleanliness of the place is guaranteed by sunshine and the use of soil. Rain will do the rest.
Yes, the rain. A beneficial rainfall can be destructive for the excavation, especially during the monsoon season. You will be surprised to see how your excavation reacts unfavourably to the rain compared with the nearby fields. The reason lies in the fact that the excavation eliminates the natural grass "skin", and the natural micro contour of the land, besides that fact that, as you excavate, you are actually digging a ditch which is therefore a natural receptacle for rainwater and surface runoff. In the first place you have to construct a drainage system all around the excavation site. If necessary, lay the drainage pipes between the untouched baulks so as to allow the water to run off from the various sectors outside the excavation. If you have a problem similar to that illustrated in Fig. 16, you can solve it using the proposed system. If you have deep trenches in very rainy regions get a diesel pump. If your budget does not permit this, borrow one or lease it from your landowner. You can also restore old drains where possible. At the end of the excavation, remember to fill in the deeper parts to restore a minimum degree of hydrogeological sustainability in your absence.
Whether you have concluded the excavation or intend to resume it the following season, between the lowest level reached and your filling, place a layer of sand or fine rubble or (although I do not recommend this) a sheet of plastic so as to clearly mark the filling plane when you (or someone else) resume the excavation. Plastic sheets are good for temporarily covering excavation areas or unremoved soil mounds during sudden rain storms. If you encounter plastered surfaces, use mats; even if they are not perfectly impermeable they will allow the artifact to breathe. The razed top of the walls, once documented, can be covered with a protective layer of compact soil as shown in the sketch. This is one of the famous "secondary works", as well as being a good method for utilizing excavated soil.

9. Preliminary notions of restoration

The term "restoration" can be interpreted in different ways, and evokes different approaches and different templates. The term comes from the Latin and means "to reinstate". A building is "restored" when its original use is "reinstated". Archaeologists and architects disagree also concerning archaeological restoration. For archaeologists, restoration is essentially "conservative", that is, its aim is to reinstate the volume within the conserved dimensions as revealed by the excavation for the purpose of conserving the static stability of the structure. Let us take the example of a vase. If the rim, the mouth, of the vase is more than 3/4 intact it is possible to reconstruct the missing part. If the rim is missing any reconstruction will be arbitrary. Also in the first case errors may be made. Supposing that in the missing 1/4 of the vase there was a spout. We do not know this and reconstruct it without a spout. The result will be a vase that is typologically different from the original one, an invention, a fake. The same concept applies to structures and architecture in general.
Another point is related to methodology. In the past (see John Marshall's 1923 *Handbook*) it was believed that restoration "must not be visible" and so techniques and materials imitating the original as close as possible were selected. Modern restoration Charters and international rules state on the contrary that the restoration "must be visible" and "readable". Therefore different or purpose-designed materials and/or construction techniques must be used (such as "set back"). As far as consolidating materials are concerned, modern intervention may in some cases foresee the use of chemical stabilizers only for friable plaster and stones (infiltration of resin like Microacril CV 40 and water; 1:3; 25% in the fractures, using syringes), and avoids the use of cement (which above all is harder than the original and may damage it): it is preferred to use easy to mix mortars based on local materials (for instance, brick dust, slaked lime, clay and straw in the ratio of 1:2:2:1), which have the advantage of being readily available, cheap, easy to prepare and lighter than the original material. If really necessary, in dry environments, you may add a mild chemical binder such as Primal (acrylic resin emulsion) diluted 10-20% in water. It must be possible to eliminate the restoration without damaging the original structure. Indeed it

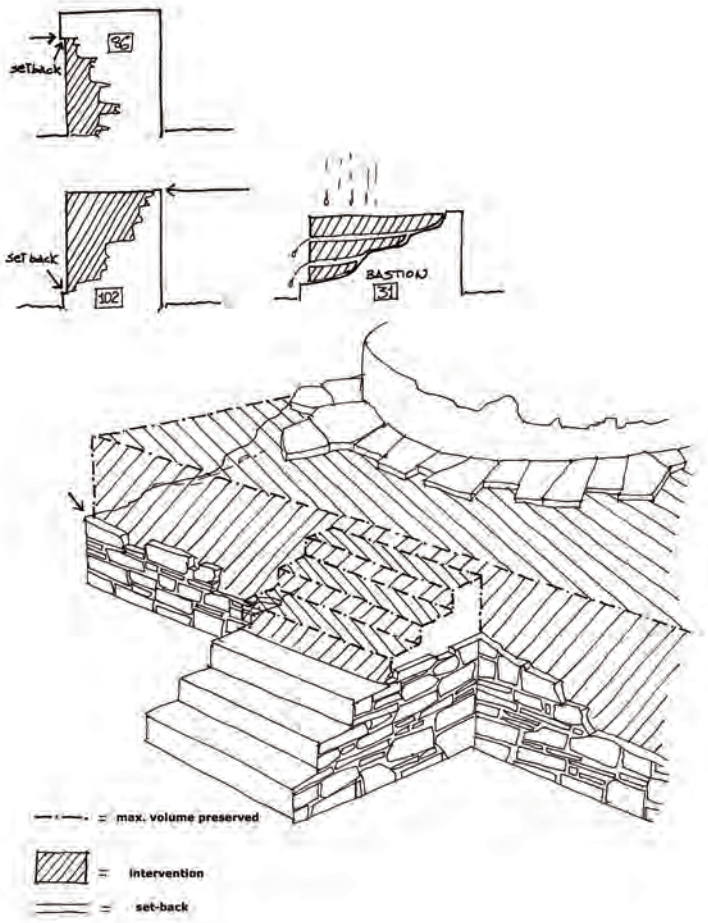

Fig. 18 - Set-back masonry restoration work: some examples.

often happens that, when removing a cement mortar restoration, the latter takes with it a part of the original structure.
The conservative action on the excavation is directed above all to the structures liable to collapse and is applied to the extent of the maximum part missing from the original structure. Mostly dry stone will be used (in the case of stone structures) or depurated clay poured into moulds (in the case of pisé, that is unbaked

clay structures). While in the second case the presence of a specialist is required, the first case, taking all due precautions, can be directed by the archaeologist.
The concept is the same as for the vase in which 3/4 of the rim has been conserved. If the restoration makes use of local stones or stones obtained from the excavation, the restoration masonry will be performed using a set back of about 5 cm with respect to the horizontal and/or vertical line of the ancient masonry. If a large volume has been restored, leave a loose stone interface and make provision for holes to drain off rain water. Water causes everything to swell, both excavated soil and the stone courses, and can cause collapses.
Remember that the aim of our action is to conserve the structure and protect it and only secondarily to allow a clearer interpretation of the monument. If you manage to achieve both results and give priority to the first point you will have done a good job. Remember however that it must be possible for anyone to distinguish which work is yours and, if necessary, remove it without damaging the original. Before concluding, the following brief notes explain how to treat the excavation materials (first-aid intervention):
1) Pottery: must be washed in running water and brushed with a light brush without removing the coating or slip, or the traces of burning/flaking and incrustations of organic material (these may reveal the contents of the vase). Leave part of your pottery unwashed for future analysis of the organic residues absorbed in the walls.
2) Coins: washed rapidly in distilled water and brushed with a soft brush to remove any soil. Dry. Under a magnifying glass use a wooden tool (i.e. something softer than the coin) to remove visible incrustations. You can then wash the coin again using a light abrasive and repeat the operation. It is a fundamental point that oxidation does not add volume, but represents a modification of the surface. By removing oxidation you are also removing part of the coin, its pattern, legend, etc. Above all, after aggressive action, while you might have a clearer image (although knowing that you have removed the top part of the image), you will also have a lighter coin and one that is numismatically less valid.
3) Iron objects: a local pack with clay mixed in a solution of distilled water and tannic and/or sulphuric acid (max. 5%) may help

to remove a tangle of rusted material and give you some idea of what the object is. Wash intensively several times, and repeat if necessary. Wash at the end with a basic solution (distilled water and sodium bicarbonate, 1:4). Always remember to use gloves and safety glasses. To inhibit corrosion after drying, a film of amber wax may be applied.

4) Stone objects: after washing, water and synthetic vinegar (2:1) packs will help to remove the more superficial incrustations. In the presence of plaster and paint traces better not to wash. Proceed in short action steps: 1-3 minutes washing and observation, followed by physical removal (as for the coins) followed by further washing.

10. The archaeological section: myth and reality

In this chapter we come back to the actual excavation and resume the discussion of methodological issues, focusing on archaeological sections. The term "section" is used to refer to two different things. The physical section is the inner wall of the excavation which runs around the trench or along unexcavated baulks. On the other hand, the main cross-section of a trench is the graphic representation of its stratigraphical sequence crossing crucial parts of the site, usually those that link the architecture to separate stratigraphic contexts. This graphic section and its geometry are selected by the archaeologist at a certain point of the dig to interpret, summarize and explain the history of the whole site.

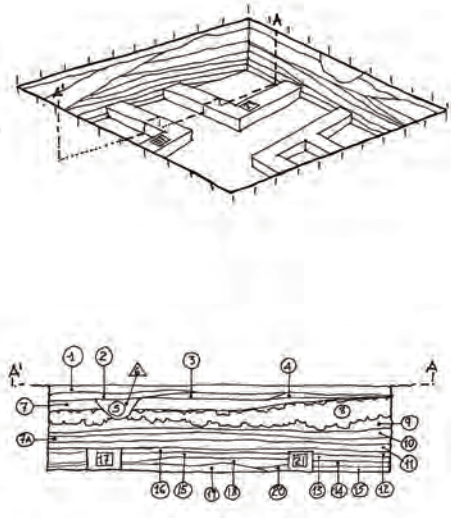

Fig. 19 - The "reconstructed" section is one of the many possible "real" sections.

When Mortimer Wheeler introduced the concept and the practice of stratigraphic recording - first in India and then in Pakistan - the use of reading the stratigraphy on the vertical (baulk or wall) sections was strongly recommended and emphasized. His system - regular grids of squares of 5x5 or 10x10 m, excavated across extensive sites - granted the presence of a continuous series of baulks that witnessed the stratigraphy of the site, no matter if the excavators had been capable of distinguishing layers and features in a proper way and excavating them one by one, without mixing their materials.

The steps of this procedure were the following: laying down the grid, excavating by squares within baulks, then, once reached the virgin soil, carving on the baulks the limits among the layers,

thus dividing the site's sequence in "Periods" (this latter practice – carving stratigraphic limits on the baulks for purpose or recording – is not recommended, unless you are very experienced).
Old archaeological practices were very hyerarchical: generally the director alone supervised the whole dig, and could link through the stratigraphy of the baulks the various excavated sectors, although the unexcavated grids concealed architecture and hindered a general appreciation of the site. Students or co-workers had a limited understanding of the general context and depended totally on the sections.
In a modern excavation, not only the students of archaeology, but also the local workers, many of which materially operate on archaeological sediments, shall interpret the dig and take part in the collective discussion, while the trench is excavated.
Sections are only a part of this process, not its final record. In fact, a wall section displays only a part of the excavation. *It has been convincingly argued that it does not represent the excavation, rather what we have not excavated!*
Modern archaeology, wherever possible, tends to excavate extensively and produces sections reconstructed from the planes of the layers surveyed using the optical level vis-à-vis a datum point. These sections, often called "cumulative", can be reconstructed in any part of the excavation, wherever they can enhance the illustration of the general stratigraphy.
All the planes have been surveyed. All the superimposed strata plans give a kind of exploded view of the stratigraphy. A section may be cut at any point and thanks to the altimetric and planimetric data it can be simply sketched where needed. A vertical section merely represents a random bi-dimensional view of the real situation, it is often taken – particularly when writing a final report - as its constraining model. A reconstructed, cumulative section represents the three-dimensional nature of the spaces in which we have been working (see Figs. 20-21).
The use of surveyed strata plans allows us to avoid the old and unfortunate habit of taking the elevation (with respect to the wall, which it is wrong, since the latter - for safety - *cannot be vertical*) of the finds. As well demonstrated by Wheeler's methodological articles, relative depth have no bearing on the chronology of the artefacts. I said "unfortunate" also because as you are digging

you mostly do not know what it is that you are unearthing, something of which you become aware only after the materials have been cleaned and analysed.
On the other hand, if the object that is identified as such only after cleaning has a label indicating the stratum to which it belongs it will also have its elevation and thus its position fixed for good in space. This does not allow you, for example, to avoid taking the position of certain medium-sized artefacts during the excavation. For this you will use the grid of squares if you have closely spaced reference points (a common case: if you are in the corner of a masonry structure), or we will use triangulation (see following chapter). Not the elevation, however, as you will already have surveyed the elevations of the stratum and will take the elevations of the following layer, which is possibly the one on which the object in question is standing.

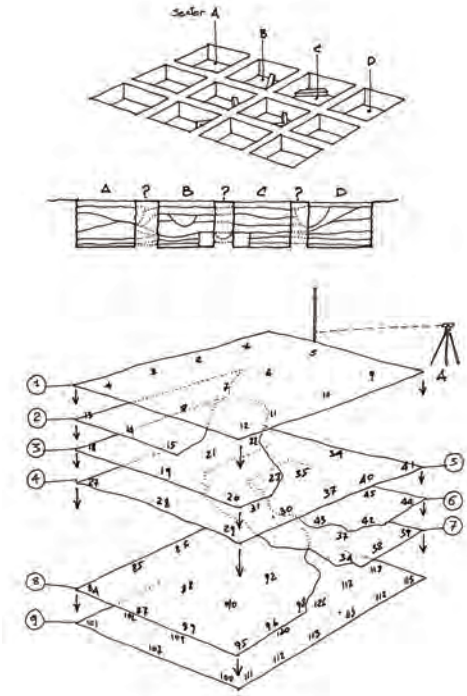

Fig. 20 - The section and its problems. 2. The sequence of the layer plans.

Graphically, the exploded view of strata (1)-(9) can be graphically represented as shown in Fig. 20, and concisely through a stratigraphic diagram, like in Fig. 21. As a matter of fact, a section is an archaeological tool like any other.
First of all, you will consider the geomorphology of the site and the consistency of its deposits in relationship with the parts to be excavated. Your strategy needs to be opportunistic. For exam-

ple, in the volume of this series dedicated to the dig of the protohistoric graveyard of Udegram you will find a long vertical (wall) section that summarizes the history of the site, as well as a complex sequence of human actions related to graveyard's life. This section, when we arrived at the site, was partly exposed by agricultural work; we exploited this pre-existing cut to get a maximum information. While recording it, with traditional manual methods, we obtained archaeological information that would have not been obtained excavating horizontally from top.

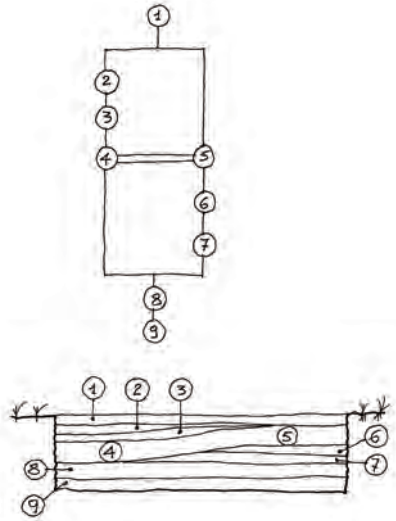

Fig. 21 - Section and matrix: a documentation that must go in tandem.

As a rule, differences in colors, texture and inclusions among layers are more precisely appreciated when these latter are superimposed and cut vertically, rather then when they are exposed side by side on a horizontal surface. Vertical sections may reveal details of stratigraphical formation processes and biological transformation not visible in other ways. As discussed concerning negative interfaces (see Appendix *c*), the limits of a naturally eroded surface are hardly visible on a horizontal surface, and better reconizable in section. Sometimes – for example within graves - it will be useful to leave small, partial sections limited to one or two layers, then document and remove them as soon as the exploration of a given surface or filling will be completed In short, there is not a single method of excavation to be recommended in every case. Besides the conditions of the site, you will choose one or the other method considering your specific goals – like in any other scientific application. Everything, ultimately, will depend on your judgment, strenghtened year after year by a growing skill.

11. Graphic and photographic documentation

~~11. Graphic and photographic documentation~~
Once a layer has been exposed with all its limits, it must be surveyed and entered on the plan. It is then photographed. Do your best to avoid dark shadow contrasts. If you have time put off photographing until the next morning or create shade using a cotton cloth screen. Position the blackboard with the data, the scale, and the graduated North arrow. Do not include equipment, wheelbarrows, workmen's legs, etc. in the photographic field. Always take three shots: one with the blackboard, scale and arrow, one with the scale and the arrow and one without anything.

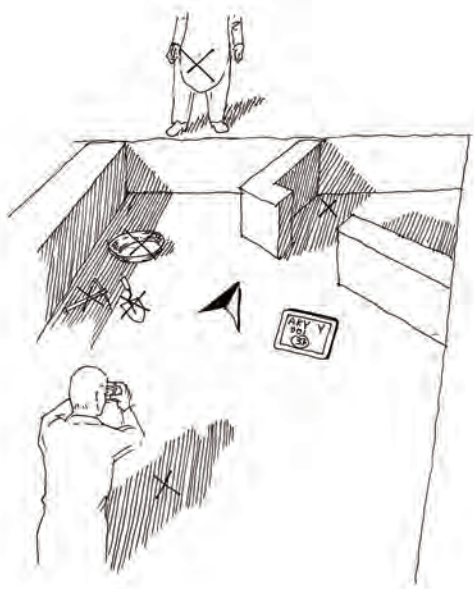

Fig. 22 - What not to do when taking the photographic documentation.

The graphic documentation can be performed by a technical specialist or by means of the total station (which reads also the elevations) with the help of georeferenced zenithal photos, etc. Only rarely will funds be available for this type of aid so it would be wiser to be able to perform the graphic documentation without help. Or rather, to be able to document the relative position of

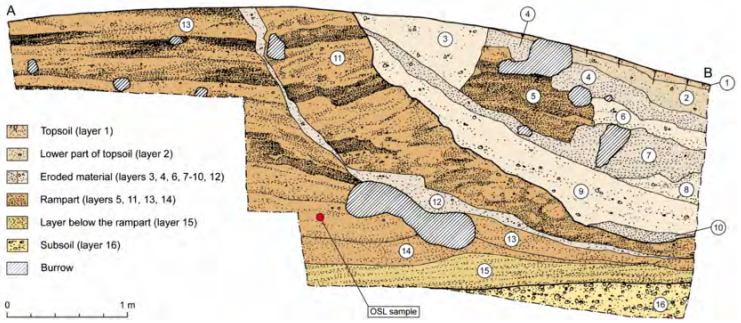

Fig. 23 - A good graphic rendering of an archaeological section; (after C Grützner et al. (2012) Improving archaeological site analysis: a rampart in the middle Orkhon Valley investigated with combined geoscience techniques. Journal of Geophysics and Engineering, *9, 4.*

Below.
Fig. 24 - An example of a stratigraphic unit form.

Archaeological Services - University of Durham: Context record Sheet

SITE CODE:	GRID REF:	AREA CODE:	**CONTEXT #:**
Type:	TST #:	Inc./Filled by:	**Feature #:**
Length x Width (m):	Depth/Height (m):		Checked by:

Munsell #: Colour description:
Composition: Texture/Organics:
Inclusions:

An	Fl	H_2O						
1	2	4	8	16	32	64	128	256

Deposit	Vertical interface	Horizontal interface
Above:	Cuts:	Above:
Below:		Below:
Cut by:	Cut by:	Cut by:
Fill of:	Filled by:	
Same as:	Same as:	Same as:
Description:		Physical matrix:

Finds:						Reliability:						Samples:
0	P	S	Def	R	Uw	1	2	3	4	5	6	Photos C:
0	1	2	4	8	16	1	2	4	8	16	32	Photos B/W:
												Recorded by:
PLANS:						SECTIONS:						Date:
Method of excavation:												Computerised:

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objects inside our excavation (the final map will be made by a draughtsman but you should be in a position to collect the data). You will need your wooden board with the 1:50 (or 1:20) scale map of the trench on it and of the bench marks drawn on millimetric graph paper. The map will be covered by a sheet of polystyrene or tracing paper. You will need a tape measure, a plumb line and an assistant.
The system you are about to apply is called triangulation. Each point that you take must be measured from two previously known points. These two measurements represent the two sides of a triangle (as far as possible equilateral), the third being

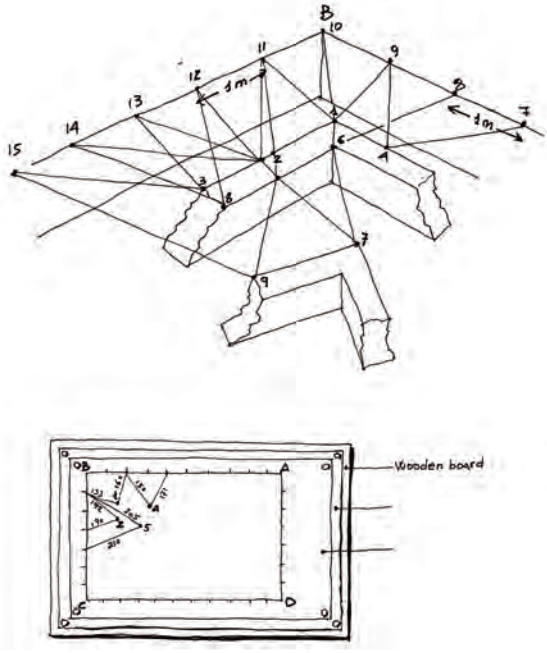


Fig. 25 - From the measurements to the drawing. 1.

known as it is the (known) distance between the two known points. For instance, you have to define the position in space of the corner of a wall. You measure the distance between the angle and two known points along the baulk. Having defined that point of the wall corner, it now becomes a known point and you can

use it to take further measures, and so on. In this way you create a network of linear measures like the one known in topography as a "trigonometric polygon". Clearly mark the points you have found with a progressive number. This has nothing to do with the number of the strata or rooms, nor with the alphanumeric definitions A3, B7, etc., of the bench marks. Use Arabic numerals, lists of numbers that you will eliminate each day. Indeed it is understood that you will mark on the plan the points on the same day as they are taken.
Measures are taken with the measuring tape held taut and horizontal (you can use a hand held bubble level to check that it is

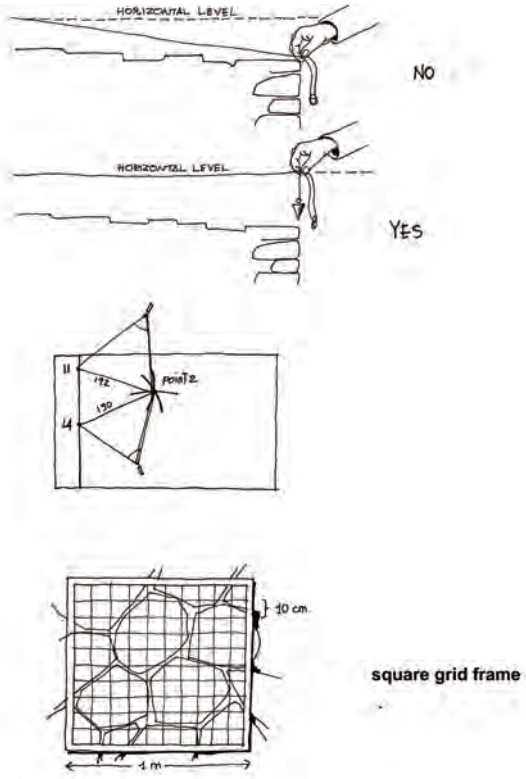


Fig. 26 - From the measurements to the drawing. 2.

horizontal). In the case of measurement of points lying at different elevations, start from the highest point and use the plumb line as shown in Fig. 26 (top).
When you get back home, either you or the draughtsman will reduce the measures taken to the scale of the map (usually1:20 or 1:50) and mark out the distances using a compass.
This is what you do: you have your sketch in progress, with the scheme of the trench and all the bench marks; we have a measurement of 1.90 m from point B11 to point 2 (wall corner), and of 1.92 m from point B14 to the same point 2. Using a scalimeter (a ruler with three faces each having different scales) you open the compass to 9.5 cm (1:20 of 1.90 m) with the point on B11 and the other part of the compass is used to draw the arc of a circle in the direction of the presumed point 2. Then we open the compass to 9.6 cm (1:20 of 1.92 m): you position the point on B14 and trace out the arc of the circle. The point of intersection between the two arcs will be point 2 (see Fig. 26, center).
In practice, this system is a simplified version of trigonometry and empirically performs what the total station does automatically in its computer.
Doing it manually is a tedious and tiring operation but an essential one. The more you manage to do without help from automated aids the more you will understand about the reality you are excavating. The great poet and observer of reality J.W. Goethe asserted that "drawing is understanding". In addition to the sketches with the measurements, especially if someone else or a machine is performing them, get used to making sketches of your structures and strata, whatever the artistic outcome. Drawing will take you to the heart of the matter, you will see it in three-dimensions, will be able to destructure and reconstruct it mentally. The fact of making a sketch by hand will help you fix the details in your memory.
If you have to sketch details, paving, etc. use the square grid frame (Fig. 26, bottom), a measurement grid consisting of a square frame on which wires are strung every 5 or 10 cm. You can make it yourself or have it made by a carpenter. Position the grid frame horizontally (it can also be used vertically: in both cases use the bubble level) and reproduce what you see, square by square, or else photograph them, trying to be as parallel as possible with the grid frame.

12. A few specific cases

a. Spoliation pits

This chapter addresses some basic excavation problems. More advanced issues will be addressed in the Appendix *c*.

In this section we deal with robbing or spoliation pits (two different destructive approaches: the first is aimed at recovering objects; the second, building materials). To begin with let us briefly see how a pit is dug. A pit is dug in the ground from a (surface) layer and cuts previous strata; then it is filled in. In the excavation you proceed in the opposite direction and so as soon as you define the outline of a pit on the surface of the layer you excavate it before you excavate the layer. In detail, in attempting to excavate the pit you are actually excavating its filling as the pit is a negative unit.

Generally speaking, each excavation is plagued with the problem of spoliation pits, especially during the first few weeks, when we work on recent stratigraphies. The pits must all be excavated with care. Why? Above all because they indicate a point where the stratigraphy has been disturbed and we need to know exactly what the horizontal and vertical levels are so as to avoid the materials getting mixed. A second reason is that all time-related evidence is precious. Even agricultural earth moving carried out months earlier must be recorded. This helps us reconstruct the history of the site, but perhaps also to understand the absence of stratigraphy linked to an abrupt change of elevation, or else an upheaval lying under an abrupt change of elevation (caused by earthmoving carried out using a bulldozer; see Fig. 27, top). Fig. 27 (center) illustrates the various stages in the creation of a pit, and then the process of excavation and documentation and an illustrative scheme of a strata plan with pits and mounds (made by the pit diggers). In Fig. 27 (bottom) we see how the pits (2)-<3>, (4)-<6>, (6)-<7>, (8)-<9>, and heaps of debris (10) and (11) have to be excavated before excavating (12).

b. Graves

Methodologically speaking, it is important to ignore the fact that the grave is your objective. Do not consider the grave as an object, as part of a closed context. An ancient grave is the result of a series of dynamic, processes, which, if viewed as being in a

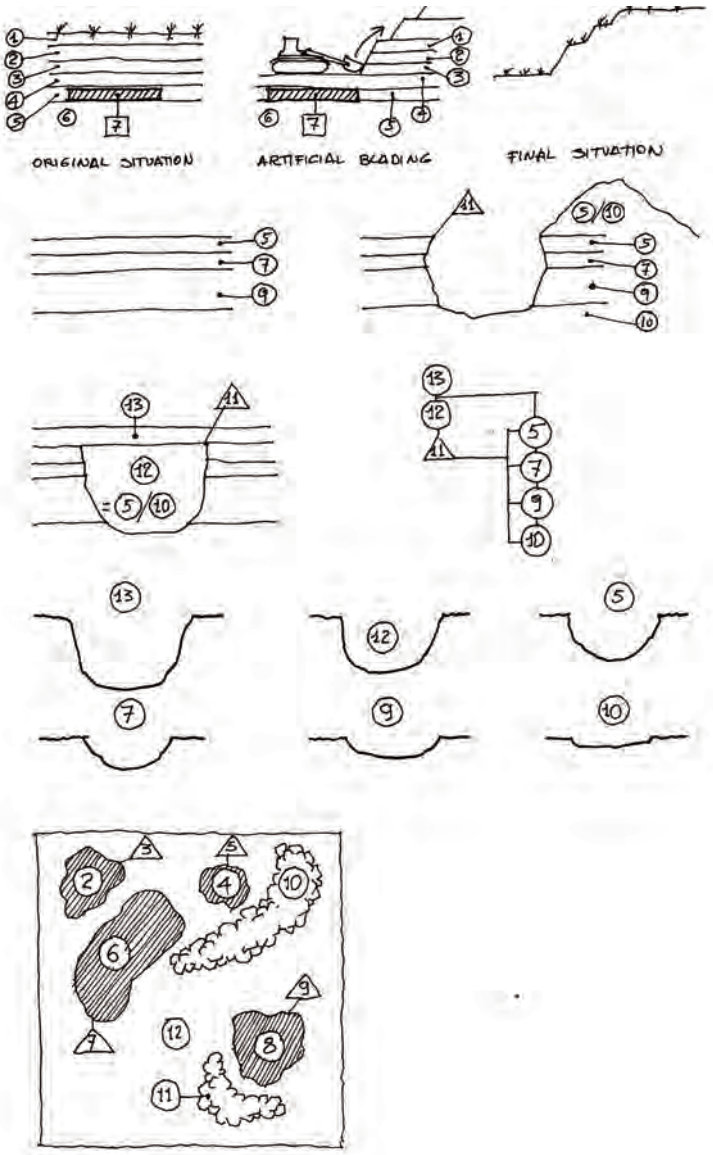


Fig. 27 - Top (first row): artificial modification of the stratigraphy.
Center (second-fourth rows): stratigraphical history of a pit and its excavation process.
Bottom (last row): SU (12) intruded by late negative/positive interventions.

closed context, will be lost. If you consider a grave as an object you will simply dig it up. A grave is a complex structure of which the shaft may be the least important part. In a simple burial the pit will stand out as the main element but in a kurgan or a pyramid the central cavity will be less important than what surrounds it. In a grave the surrounding part is the part used by the living (re-opened for later burials, memory, worship, etc.). In any case the physical grave must be accessible through a frequentation level, it must be visible, have an elevation with monumental features, even if marked only by a stake and coloured flags (perishable material, of which in the hole of the stake will be all that is left in the excavation).
If you are excavating a grave you must have a solid knowledge of anatomy and it is good practice to have the neighbouring

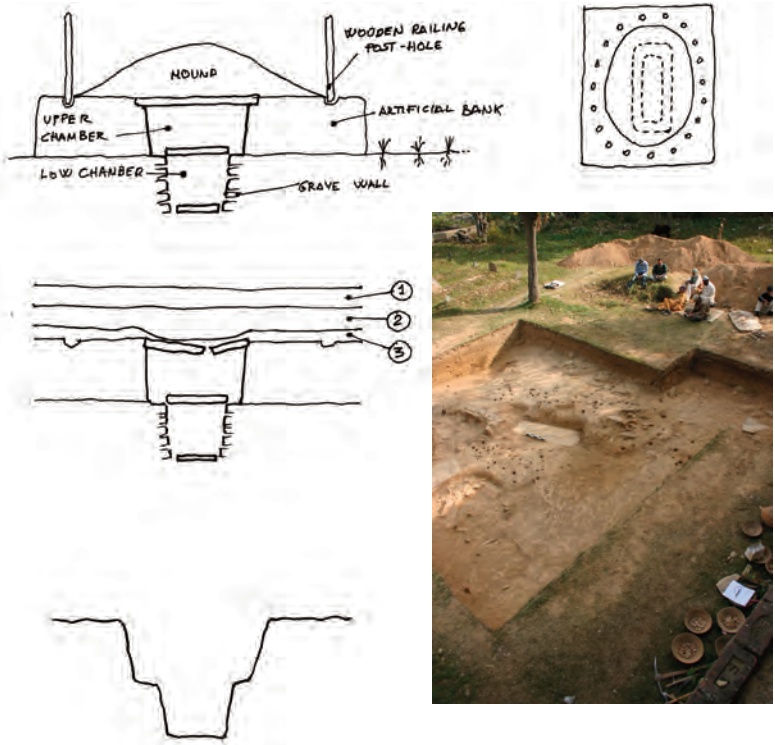


Fig. 28 - The grave and its stratigraphical problems.

strata excavated by a physical anthropologist; sometimes you will isolate and remove the bottom plane with the whole skeleton or the urn with the cremated bones and excavate it calmly in a covered area. If this is not possible, try to excavate having an anatomical scheme at hand to record the bone parts as they are excavated, and sieve and flotate the soil (see below).

Fig. 28 illustrates the excavation of an ideal grave complex: a double chamber grave. The upper part constructed in elevation, covered by a mound of beaten earth and with a wooden fence around it. Under the superficial layers (1) and (2) we find layer (3) which corresponds to the collapse of the mound which covers also the artificial bank (4) on which we may find the traces of the wooden railing. On the other hand, (3) is typically found to be darker in the part corresponding to the grave dug underneath: the change in colour is interpreted by archaeologists as a marker of the top of the grave and is excavated from this point on. As we shall see in the chapter dealing with the issue of strata colour,

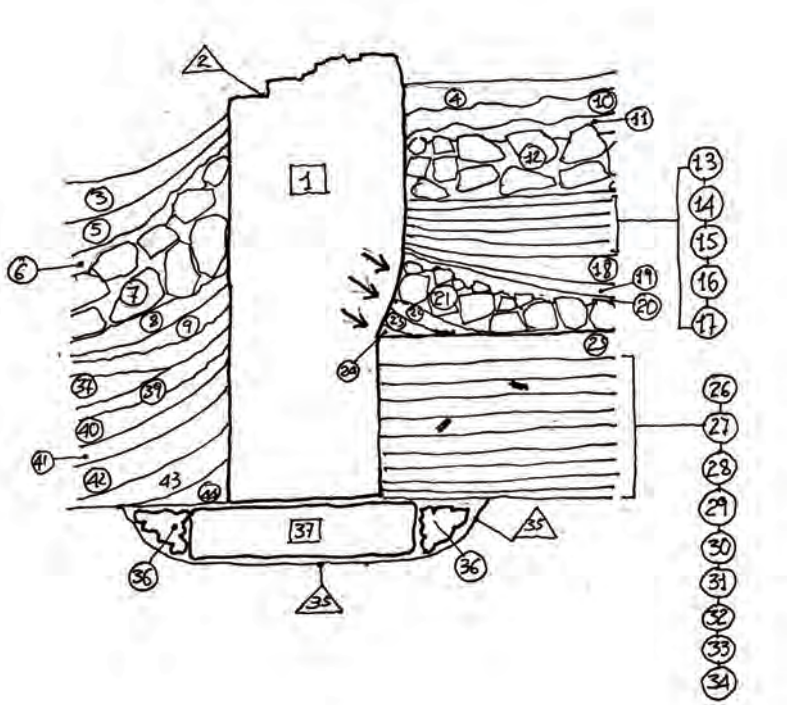


Fig. 29 - Internal/external stratigraphy, floors and masonry failures.

(3) is darker only as a result of the accumulated humidity which is indeed due to the underlying grave. Neglecting this, the archaeologist who opens the grave from this point will not realize that (3) is a collapsed mound covering (4) with stake holes (6)-<5>, (7)-<6>, etc. Having excavated the grave in this way, he/she will have reduced it to the level of a mere pit and will never know the form it had in ancient times (the form we have imagined in Fig. 28) (see the additional note in Appendix *c*).

c. *Structures, foundations, surfaces, masonry failures*
Much of what is described in this section can be observed and documented following an ethno-archaeological approach. In most of rural Pakistan building techniques have not changed, mainly because the materials used have not changed. When the

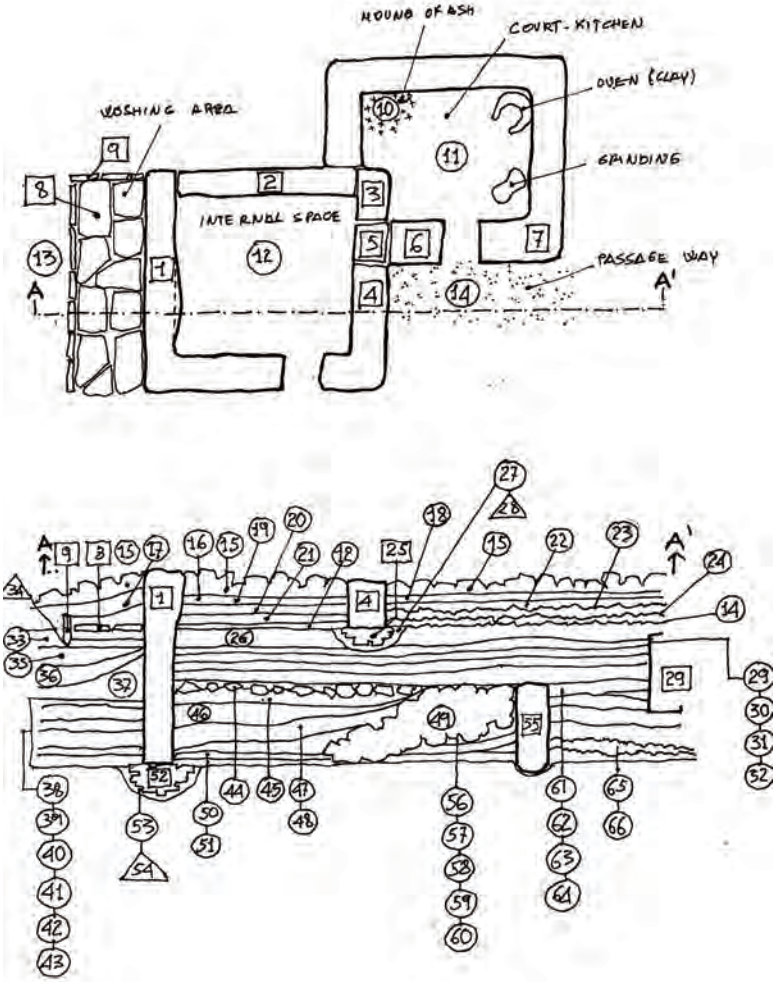


Fig. 30 - Post-abandonment phases (horizontal stratigraphy: plan) and their earlier phases (vertical stratigraphy: section).

latter changed (for instance, after the introduction of concrete or bricks) the techniques changed. In the presence of traditional techniques the processes of growth and distruction of structures will be the same as we find in the excavation. In a traditional/vernacular house the structures are generally featured by: stones and/or clay for vertical structures (or stone foundations inside foundation trenches with mud brick elevations), beaten clay for floors, further thin deposits (overlapping floors) that gradually cover the thresholds and reduce the doorways, walling up of the doorways and modifications that retain part of the original structure, etc. Structures often have small foundation trenches, subsequently filled with debris produced by masonry work (stone chips, sand, rubble). The foundation trenches must be fully understood and if necessary inspected by means of small trial trenches. If the wall actually continues beneath the floor it means that it is obviously older and has been re-used. Near the foundation trench (along the wall) the colour and composition of the soil will change and turn darker, since (as explained above) it is the filling of an empty space in which also humidity is trapped. The internal planes are often made of depurated and compressed clay, these layers with the consistency of leather, of a lighter colour than the deposit strata. The lighter colour is the result of two concurrent factors: the use of sifted clay and, in the case of courtyards or verandahs, exposure to sunlight. Paved planes in urban environments are almost always external and related to the presence of water (courtyards with wells, for example). The internal courtyards, which contain kitchens and ovens, often have large lenses of (grey) ash with presence of charcoal fragments trodden into the layer. Sometimes in the case of cave-ins (or wall collapses) they are simply flattened and building takes place around them or on top. A collapse does not represent a totally negative phase: sometimes it is utilized in such a way that the overlying architecture is dependent on it for its formal structure. In these cases we find appreciable increases in elevation, the consequent walling up of doors and the opening of new passages. Doors are often closed with wall sections that are only partially executed and sometimes completely separated. Street or external paths are characterized by water flows (streaming) which expose and transport sand and gravel and leach the clay; potsherds are broken up, diffuse, of small size, sometimes leached (with the

broken edges rounded off) if lying horizontal to the plane, or else fixed vertically in the surface (because of the trampling): in this case they will be smaller with sharp edges.
Great attention must be paid to bulging and leaning walls. These clearly indicate a collapse phase starting from a given layer upwards (i.e. standing in the void): a structure can bulge (collapse) or lean if it has been left standing in a state of abandonment or not properly managed (see in Fig. 29 how [1] behaves from (25) upwards: the leaning process is marked by the arrows). In the case of dry wall architecture you will notice in abandoned villages that before leaving them the owners or other subjects will first remove the recyclable materials, especially wood: roof beams, door and window frames and doorsteps. Such elastic structures are part of the building's skeleton and their removal accelerates the process of degradation, loosens joints and causes collapse. The contruction of a closed dry masonry building requires, immediately after the foundations, the positioning of door fixtures around the wooden frame of which the mason will build the elevation; the same is true for window frames.
In Fig. 29 you will note the different behaviour of the strata in the external areas compared with the internal ones. For the sake of example, let us also imagine that a coin is found in strata (25), (27) and (29). When the coins are found in a layer, as in (27) and (29), they belong to that layer and not to the lower one. Heavy objects move downwards not upwards. Unless of course you are on the surface of the layer: in that case we can imagine that it belongs to the layer supporting (25). Of course, this is true in general: much could actually be said about the concept of interface. Layer (25) could actually comprise a negative interface or surface that is theoretically different from its positive body. It is like saying that the surface of a water body differs from the water below.
In Fig. 29 we find the following sequence:
Period I: foundation trench of [37]; construction of [1]. Inside: increase of planes (34)-(26); long duration floor (25).
Period IIa: temporary abandonment and subsequent bulging (marked by arrows).
Period IIb: collapse (21) of structure with sediment strata beneath the collapse (percolated from above): (22)-(24); phase of final abandonment with thick non compacted strata (20)-(18).

Period III: series of anthropic re-use planes: (17)-(13).
Period IV: new collapse (12) and final abandonment.
It is a matter of relating the interior to the exterior: it seems likely that the external area in Period I was occupied by a passageway with thin overlapping deposits (39)-(37), (44) in the form of mounds near the external base of the wall [1]. In an intermediate phase we again have a passageway with overlapping deposits; the collapse (7) is contemporary with (21) in phase with the Period IIb documented in the interior. In Period III the external area displays no signs of re-occupation, unlike the interior.

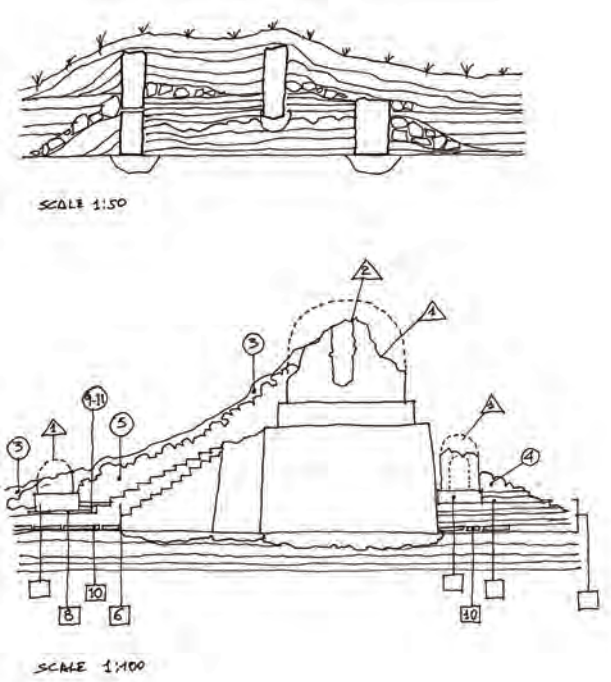


Fig. 31 - Stratigraphical "behaviour" in settlement and sacred areas..

d. *Religious monuments*
So far we have examined how a dwelling structure reacts over time, with its superimposed floors, walling-ups and resumption of walls, etc. We have also seen how an internal space reacts in

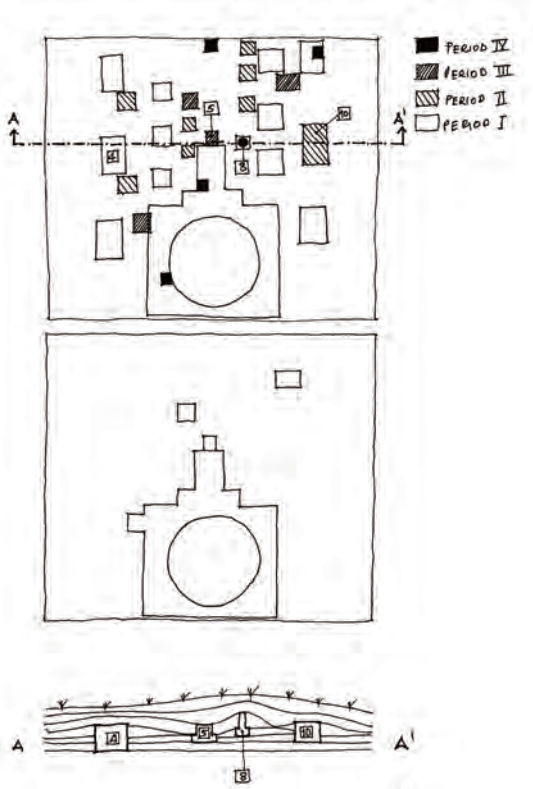


Fig. 32 - "Structural" stratigraphy in a sacred area.

a different way to an external one, how difficult it is to relate the different rooms, etc. In a settlement, the phases of transformation, re-use, demolition, reconstruction, etc. follow each other continuously side by side with long abandonment phases characterized by collapses and alluvial deposits that occur above all in the absence of drain maintenance, etc.
None of this is generally found in a religious monument, the structural life processes of which are obviously governed by different laws. The basic law consists of the fact that the monument in itself represents a factor of immobility. This is what I mean: a Buddhist stupa may undergo many building phases, interventions and expansions, but will never have the flexibility of a dwelling structure. The floor plane, for example, with stone paving, will

be maintained for centuries in that form and swept and cleaned, and as far as possible cleansed of traces of occupation while the floor of a room is maintained throughout its growing process formed by overlapping layers, with its residues sealed under each new beaten earth floor.
By means of two sections Fig. 31 illustrates the different stratigraphic situation regarding two contemporary sites within the same chronological span: one is a settlement area and the other an isolated sacred area.
What changes in the sacred area is the monument, the addition of new chapels, the alteration of existing ones. Also the floor will be raised, perhaps two-three centuries after its construction, but by means of the deposition of plaster/clay layers. All these actions are aimed at obtaining religious merit, are the result of donations, acts that increase/modify for non practical reasons the immutable datum of the religious monument. Then there will be collapses, temporary abandonment, episodes of re-use. The point is that a monument remains sacred as long as it is considered such by a community, even when time has reduced it to a ruin. A dwelling is not.
The periodization of a religious monument is therefore based more on its structural interpretation than on its stratigraphy. When it has not been disturbed, the latter may be found to be highly compressed downwards (as long as the monument retains its original features), and highly expanded upwards when it continues to be frequented for the purpose of worship even when it has partly collapsed. Much attention must be focused on the pre-construction and post-abandonment phases, which will provide us with elements of great use in understanding the development of that a-stratigraphic wonder that in many cases is represented by a religious monument.
Fig. 32 illustrates examples of structural stratigraphy: Period I: [4] is contemporary with the main stupa; [5] and [10] are built on the raised Period II pavement; the votive column [8] is built on the Period III pavement, when [4] and [10] were abandoned.

e. *Abandonment phases*
A typically neglected phase in archaeological excavation is that of abandonment. The archaeologist is often looking for a confirmation of a previous hypothesis; he/she is in any case tempted

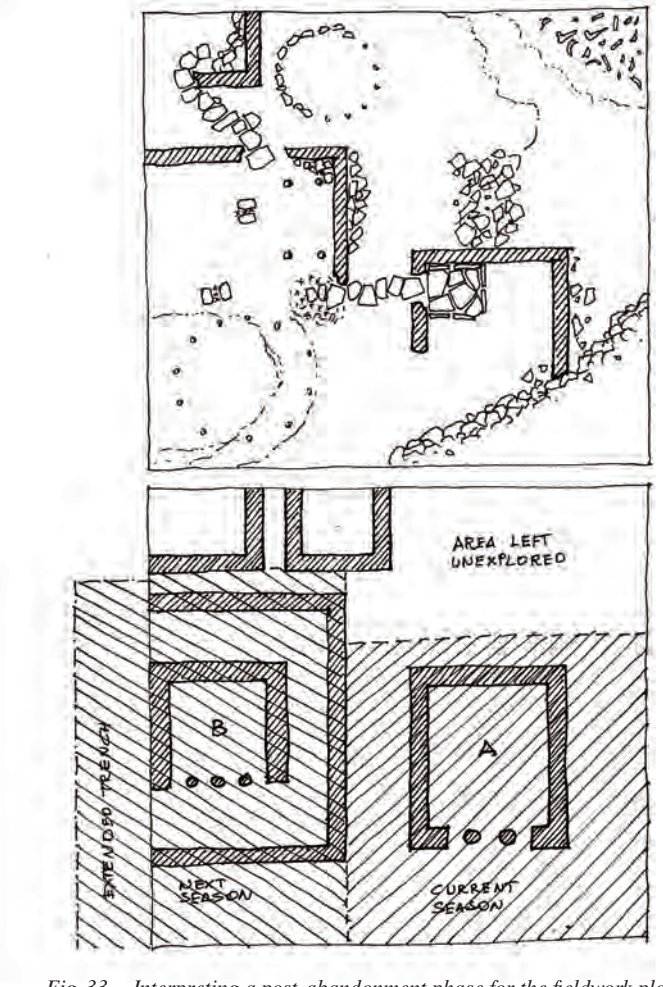
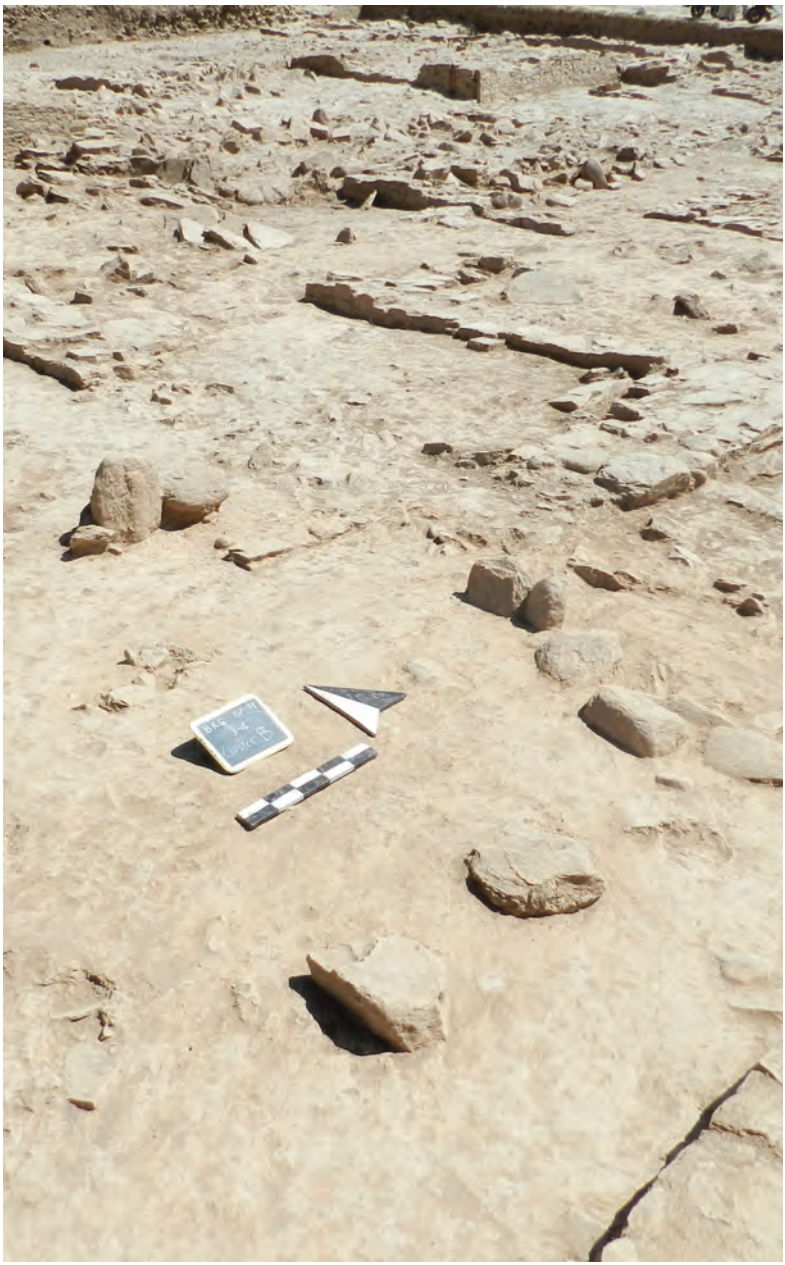


Fig. 33 - Interpreting a post-abandonment phase for the fieldwork planning.

to go straight to the "good" levels, often neglecting the superficial phases which are deemed to be relatively uninteresting. This is an error of both method and substance. In an excavation, all phases are important and only an overall understanding of them can yield a reliable three-dimensional reconstruction of the site. In essence it would be like denying that the circumstances of the death of an individual are of any biographical value. The final

phases can instead tell us much about the preceding ones. It is always advisable to work extensively: the larger the area the easier it will be to understand the site and the more focused the in-depth investigation will be.
Let us imagine we are working in a trench measuring at least 50x50 m inside an ancient inhabited area (go back to Fig. 30).
It matters little whether its supposed chronology is mediaeval or protohistorical. Exposing the abandonment phase over the entire area means being able to carry out a surface reconnaissance and observe what the surface was like at the time of the abandonment, as though we are on an actual journey in time. Many interesting discoveries will be made. For instance, in the case of a historical period dwelling area it may be noted that abandonment was followed by phases of temporary re-use by nomadic or subordinate groups, and that this phase took the form of a re-adaptation of the already ruined structures. We will find butchering areas, fireplaces, working areas, discharge areas which, we will discover, are only partially related to the original functions of the inhabited area. The passages are re-used but animals are butchered e.g. in the courtyard of a former residential structure.
After the re-use phases have been defined, trying to understand the abandonment means understanding the technical reasons behind the death of a human spatial agglomeration: observe the collapses and try to understand whether they are due to an earthquake (for instance in the case of collapses all occurring in the same direction or of whole blocks); seek the traces of widespread burning by observing the traces of oxidation/scorching on walls; analyse the presence of large alluvial layers, testing the depth and trying to understand whether they are the result of flooding (these are often associated with landslips, that is, slow cave-ins or collapses in which the debris did not accumulate, but are horizontally dispersed). Fig. 33 represents an ideal situation: the analysis of all the post-abandonment will lead to the interpretation of the outcroppping structures and good planning of the work. After the surface reconnaissance it is decided to concentrate on building A and to leave building B to a later season after leasing an additional area, while the entire N sector is left unexcavated.



13. Archaeologist's responsibility: after the excavation

Paradoxically, until a site is excavated it is "virtually" protected. After it has been excavated it must initially be protected by the excavators. You cannot wait until it is automatically taken over by the competent government entity unless something truly important or architecturally significant has been discovered. In purely legal terms, while every site older than 70 years is automatically protected, but practically, especially vis-à-vis third parties, the site must be "notified".

"Legal notification" involves a series of steps that take time. Initially the government entity requests action by the local authorities to define the land registry parcels and ownership, if necessary also their valuation for the purpose of purchase. Once the cadastral and scientific data have been acquired (site typology, chronology), the State entity prepares the notification which will be published in the official gazette.

In the meantime, the signatory to the leasing contract, that is, your team, is responsible for site maintenance, but also for what happens on site, such as accidents, etc.

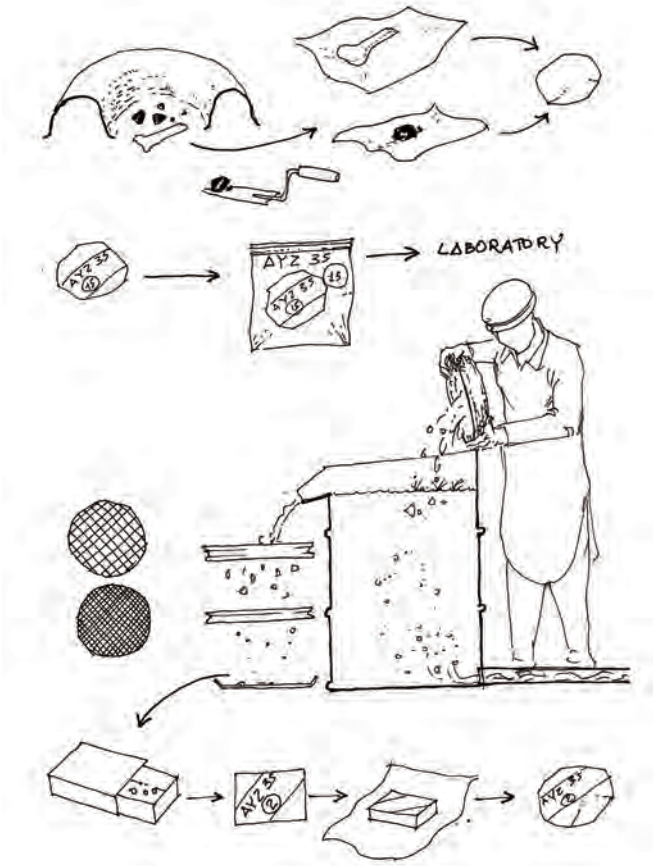
Accident prevention is a must for an archaeologist performing an excavation involving workmen: a fundamental objective of your excavation is that no one should be hurt. Attention must remain focused also after the excavation: the area must be fenced off and overseen by a team of watchmen. Even after the site has been notified and until such time as the site has been handed over to the government entity you are still responsible for maintaining and it and its surveillance.

An excavation must therefore be planned in all its aspects – initial legal (permit), administrative, scientific and again legal (notification and surveillance). It is not permissible to excavate and then leave everything without surveillance in the end. Among other things it has been statistically proven that illegal digging increases exponentially in areas in which excavations have been discontintinued and with no surveillance while they decrease with increased legal excavation activity and in the case of excavations under due surveillance.

Excavating a site is an exciting activity in which life in the open air is combined with an intellectual challenge. However, a work carried out responsibly will be your most important result.

14. Appendixes

a. *Collection of organic samples: flotation and 14C*



Charcoal, bones, and other organic samples should be handled without touching them directly, and wrapped in tin foil.
Each sample will be labeled and put in a (labeled) zip-lock bag.

Floating process: light/organic remains stay afloat and can be sieved; when dry they are collected and labeled as above.

b. *Colour and composition: the nature of the layer*

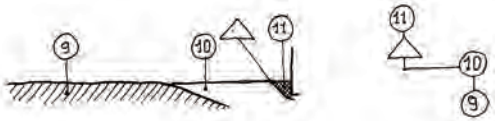
The layers are distinguished by colour, composition and nature
(1): compact clay, yellowish, uniform: surface=floor
(2): loose clay, blackish: deposit
(1) covers (2)/(2) is covered by (1)
(1) is later than (2)/(2) is earlier than (1)

(3) sloping accumulation of stones: collapse
(4) horizontal silty clay, yellowish: alluvium
(4) covers (3)
(4) is later than (3)

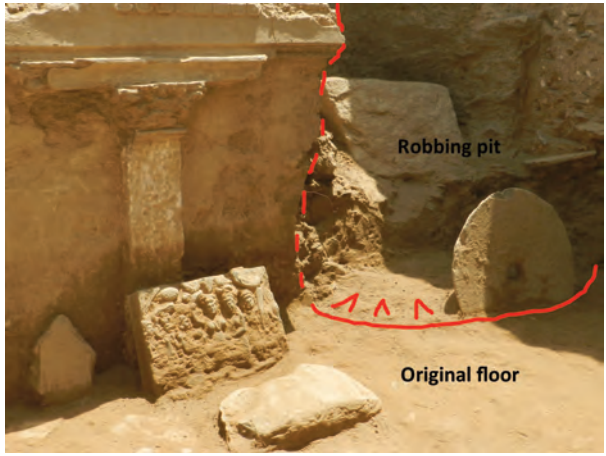
(5) compact clay, reddish: floor
(6) loose clay, brownish: filling of pit <6a>
(6) fills pit <6a>; <6a> cuts (5)
(6) is later than <6a>; <6a> is later than (5); (5) is earlier than <6a> and (6)

(7) clay mixed with gravel and sand, compact with trace of water passage; with sherds fixed vertically: external surface=pathway
(8) brownish clay, loose with ash: intentional deposit
(8) covers (7)
(8) is later than (7)

(9) sloping yellowish clay, silty: external surface
(10) loose clay, yellowish, with sand and gravels: deposit
(11) loose clay with stones: filling of <11a>
(11) fills pit <11a>, which cuts (10), which covers (9)
(11)-<11a> are later than (10), which is later than (9)



Stratigraphic description of Fig. 40 (top: annotated axonometric draft; center: matrix of the wall units; bottom: full matrix):
Layer (18): surface, covers (17): deposit, post-abandonment, which covers (12): collapse, whis is associated to <1>-<2>-<3> (razed wall surfaces) and covers (13): floor associated to [4]=[5]. (13) covers (14) and (15): floors associated to [8] (covered by [4]). Foundation [9] of wall [8] is associated to wall [7] and to foundation pit <11> cut in (19), filled by (10) and covered by (16).



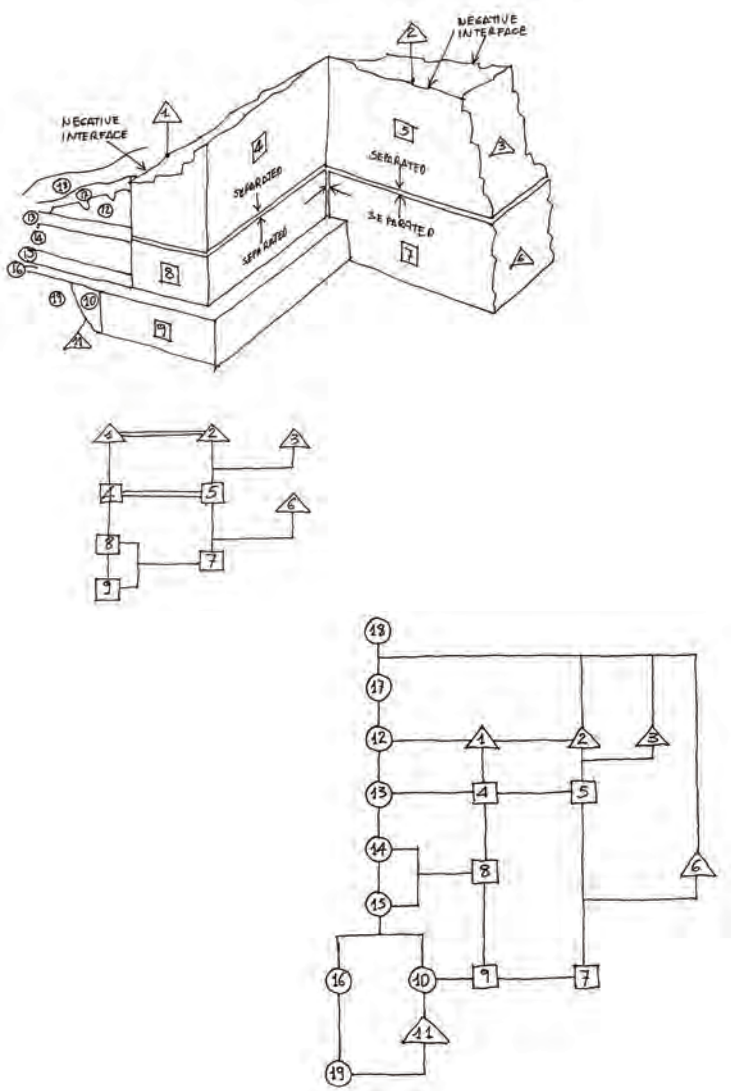


Fig. 40 - A combination of wall structures and foundations illustrated by their structural and stratigraphical matrices.

Previous pages:
Fig. 34 - Collection of organic samples and flotation.
Figs. 35/39 - Colour, nature and position of layers: some examples.

c. Notes on some advanced issues

Negative interfaces

Let us spend few words on the concept of "negative interface". In stratigraphy, each physical find (for example a floor, a wall, a fallen column, a layer of carbon due to a firing) corresponds to a specific event. The sequence of these events in time allows us to reconstruct the history of a site. But there are events that do not leave similar material evidence. A hole, for example, is defined by its surface and its geometric form; its content or filling is not necessarily contemporary. In fact, while the pit of a grave, in most cases, is refilled soon after burial, a ditch in front of a city wall may be filled centuries after its first digging. Similarly, the destruction of a wall is witnessed by its broken (razed) upper surface; but its dismantling may have taken place for centuries, from its first collapse to the final, slow phases of crumbling and erosion. For this reason, the negative interfaces (the surfaces of the pit or the broken top of the wall) in stratigraphy are labeled with a specific number, different from those of the filling layers, or of the stones collapsed against the broken wall.
An important type of negative interface are ploughing marks. The plough leaves in the soil series of distinctive parallel, V-shaped furrows.
Some negative surfaces are not made by man, but natural. For example, when we excavate on a slope, the surfaces are costantly washed and incised by runoff water. Natural erosive interfaces may be difficult to identify when you excavate horizontally, but easier to see in section.

Removal of earthen blocks and laboratory micro-excavation

Sometimes on the dig you will find the remnants of complex and delicate objects in perishable materials, or fragile parts of burials that deserve a greater attention and a particularly careful documentation. Often similar finds cannot be left on the field, where they can be damaged by exposure to air and rains. Depending on the type of surrounding sediments and their compactness, these finds can be isolated within blocks of earth, fixed with bandages, gypsum, wax or wooden frames tied up with iron wire, and underexcavated while gradually supporting their bottom. Then, such blocks can be lifted and removed, to be brought to a lab to be micro-excavated with the due security and care. Do not under-estimate the complexity of these operations. A micro-excavation in an archaeological lab will require the same stratigraphical approach and recording procedures of normal, larger scale digs.

Excavating on a steep slope

If you excavate on a steep slope, after removing the topsoil you will see some parallel strips of soil distinguished by different colors or lines of stones. In this case, it is important to start the excavation from the uppermost layer, exposing its inclusions and possible architectural features on its inclined surfaces. In these cases, to excavate by the means of geometric horizontal cuts will mix

materials of different periods beyond hope of recovery.

Architectural remains

After removing the agricultural or recent topmost layers, you may uncover the first architectural remains. The emphasis of this manual is on the archaeology of north-western Pakistan, so the models and discussion often gives for granted that architecture is made of dry masonry or of stones fixed with clay mortars. However, it will be enough to look to a contemporary rural landscape in Khyber-Pakhtunkhwa to see, often in the same building complex, walls made in mudbricks and in pisé (piled mud blocks), in rammed earth, in fired bricks, in concrete and abundant erections in wood (poles, planks, recycled boards) and other materials. It is important to observe the present reality, and keep your mind open when you interpret the archaeological record. Mudbricks and mud walls may be exceedingly difficult to excavate, even more when the walls are collapsed and weathered. Usually, mudbricks are better recognized when their rectangular contours, set in regular rows, are carefully scraped manually with a trowel and contrast with the color of the mortars and plasters. Experience will make the rest. Post-holes are found as round pockets, usually filled with softer and sometimes darker sediments. Poles may be burnt or have rotten on the spot; more usually, were removed manually and the remaining holes were filled by the surrounding sediments. Excavated carefully, post-holes will revel their depth, pointed end and the inclination of the shaft. A word of caution: post-holes may be easily confused with rodents' burrows. Dark linear traces on the ground may witness the original location of logs and planks.

Description of layers and site formation processes

Archaeological layers are not only "chronological containers". Their formation is a complex process, in which natural agents like water, gravity and biological activities interplay at lenght with the work of man. Therefore, stratigraphical processes are culturally determined and as any other artifact can reveal a lot on the ancient culture under study. For example, the slopes of the Swat valley are covered by the remants of ancient colluvial sheets, formed by the slow sliding of fine sediments coming from the gradual abandonment of terraces of the early historic periods (as shown by the many Kushan sherds they embed).
These layers witness a great agricultural exploitation that came to an end before the Hindu-Shai period. In describing a layer, you will first consider the *geological matrix*, or the finest fraction of the sediment: it may be composed, in order of grain size, of gravel, sand, silt or clay. Then you will look carefully at its inclusions: rocks of different types, form and size, potsherds, charcoal bits, powders and particles of fired clay, pieces and chips of animal and human bones. Matrices and inclusions, with some experience and possibly the help of a geomorphologist and a sedimentologist, will give a lot of information on what happened at the site. At present, geomorphologist take small blocks of sediments, get from them large thin sections, and look at these soil sections with powerful microscopes, further detailing the original field observations.

Recording with zenithal pictures and AUTOCAD rendering

In many excavations, archaeologists and surveyers nowadays take a set of topographical points by the means of a total station. Than they take vertical digital pictures from cameras held above the trench, join the pictures with commercial PC applications, and draw their maps on scale on the photoplanes so obtained in AUTOCAD or Adobe graphic environments. Although this procedure is doubtless unexpensive, fast and relatively precise, nothing can substitute the detailed observation that comes together the long observation required by traditional hand-mapping. The problems are 1) you have anyhow to decide which layers and features must appear together in a phase map, something a machine will never do; 2) you tend to accumulate photoplanes that are not interpreted, thus loosing the memory and evidence of important details; 3) in the photoplanes, the colors of the layers are not so evident, and many small finds and inclusions are not always visible; 4) when you draw, you discuss color and limits with the other excavators, while when you digitize photoplanes you are alone; therefore, less informed and less critical. The same problems are encountered when vertical sections are recorded with the same technology. The best solution may be a compromise – construct your recording base with these new technique, but keep the partial maps on the field and constantly update them by adding manually limits and details.
Note: *Amongst the digital tools available, it may be also worth mentioning the existence of softwares specifically intended for the creation of stratigraphic matrices (see http://www.harrismatrix.com).*

Sheltering

In theory, we may choose to protect an ancient ruin with a roof shelter. Architects love shelters, but in practice they are ofter harmful (the shelters, not the architects!). Shelters need to be anchored to the ground, into the archaeological deposits. Furthermore, after some years you will spend your scarce funds for restoring the shelter. Better restore and mantain the excavated monument.
Note: *If an excavated site cannot be properly protected (legally and/or physically), enhance and maintained, the most practical solution will be a fast refilling of the trench.*

Graves

Graves may be frequently re-opened and re-used for multiple funerals. In this case, besides discovering remnants of more than one individual, you might observe, in plan or in section, evidence of supeimposed pits around the mouth of the shaft. By a careful study of the processes of bodily decomposition and of the filling of the central shaft, it will be possible to understand if the grave's chamber in origin was empty, or filled with earth: a crucial aspect of the funerary ritual. We know cases of graves re-used centuries after their first construction: if ignored, similar practices would place nearby vessels and other artifacts of different periods, confusing your typologies.

d. The four laws of archaeological stratigraphy

A quotation from E.C. Harris (1979) The Laws of Archaeological Stratigraphy, *World Archaeology*, 11, 1, pp. 111-117.

The Law of Superposition: in a series of layers and interfacial features, as originally created, the upper units of stratification are younger and the lower are older, for each must have been deposited on, or created by the removal of, a pre-existing mass of archaeological stratification.

The Law of Original Horizontality: any archaeological layer deposited in an unconsolidated form will tend towards an horizontal disposition. Strata which are found with tilted surfaces were so originally deposited, or lie in conformity with the contours of a pre-existing basin of deposition.

The Law of Original Continuity: any archaeological deposit, as originally laid down, will b bounded by a basin of deposition, or will thin down to a feather-edge. Therefore, if any edg of the deposit is exposed in a vertical plane view, a part of its original extent must have been removed by excavation or erosion: its continuity must be sought, or its absence explained.

The Law of Stratigraphical Succession: any given unit of archaeological stratification takes its place in the stratigraphic sequence of a site from its position between the undermost of all units which lie above it and the uppermost of all those units which lie below it and with which it has a physical contact, all other superpositional relationships being regarded as redundant.

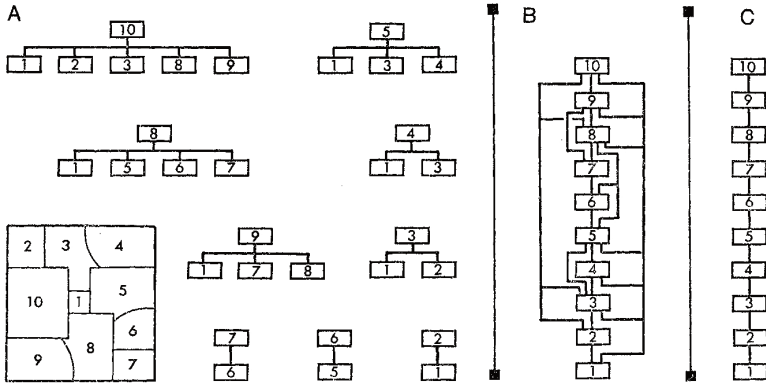


Figure 1 The superpositional relationships of the plan are shown in A and B. Diagram C is the stratigraphic sequence of this hypothetical site

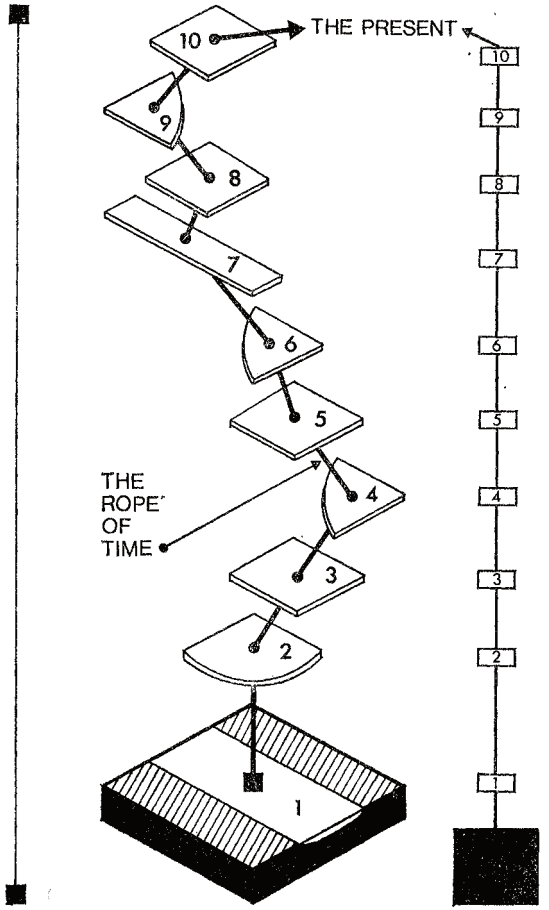


Figure 2 An exploded view of the plan (*fig. 1A*) to illustrate the deposition of its deposits through time; on the right is the stratigraphic sequence

15. A bibliographic handout

J. Marshall, *Conservation Manual. A Handbook for the use of archaeological officers and others entrusted with the care of ancient monuments*. Calcutta 1923 (reprint Asian Educational Service 1990).

R.E.M. Wheeler, *Archaeology from the Earth*. Oxford 1954 (Clarendon Press).

E. Anati, *Metodi di rilevamento e analisi dell'arte rupestre*. Studi Camuni VII. Capo di Ponte 1976 (Edizioni del Centro; English version available).

Ph. Barker, *Techniques of Archaeological Excavation*. Batsford 1977 (Routledge).

T.F. King, *The Archaeological Survey: Methods and Uses*. Washington 1978 (downloadable for free at: http://www.fire.ca.gov./resource_ngt/archaeology/downloads/archsurveymethods.pdf).

E.C. Harris, *Principles of archaeological stratigraphy*. New York 1979 (Academic Press) (downloadable for free at: http://www.harrismatrix.com).

D. Watkinson (ed.), *First Aid for Finds*. Archaeological section of the United Kingdom Institute for Conservation. London 1987 (The British Archaeological Trust).

Archaeological Site Manual. Museum of London Archaeological Service. London 1994 (3rd Edition); (downloadable for free at: http://www.museumoflondonarchaeology.org.uk).

C. Renfrew, *Loot, Legitimacy and Ownership. The Ethical Crisis in Archaeology*. London 2000 (Bristol Classical Press).

S. Roskams, *Excavation*. Cambridge Manuals in Archaeology. New York 2001 (Cambridge University Press).

G. De Palma, F. Colombo, M.E. Prunas and M. Vidale, *Guidelines for the Conservation of Gandharan Sacred Areas*. Istituto Centrale per il Restauro in collaboration with the Society for the Preservation of Afghanistan's Cultural Heritage (SPACH) (English-Dari edition). Kabul 2006.

B.A. Kipfer, *The Archaeologist's Fieldwork Companion*. Padstow 2007 (Blackwell Publishing).

G.G. White and T.F. King, *The Archaeological Survey Manual*. Walnut Creek 2007 (Left Coast Press).

VV.AA., *Safety in Archeaological Excavation Sites*. The University of Edinburgh (no date); (downloadable for free at: http://www.arcl.ed.ac.uk/safety/field.html).