

THE TELL EL-HESI FIELD MANUAL:  
THE JOINT ARCHAEOLOGICAL EXPEDITION  
TO TELL EL-HESI VOL. 1

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Frontispiece. View from the southeast across the wadi toward the acropolis at Tell el-Hesi during the 1973 season. Field III is visible on the lower southern slope to the left of the wadi face.  
Photo by W. Nassau.

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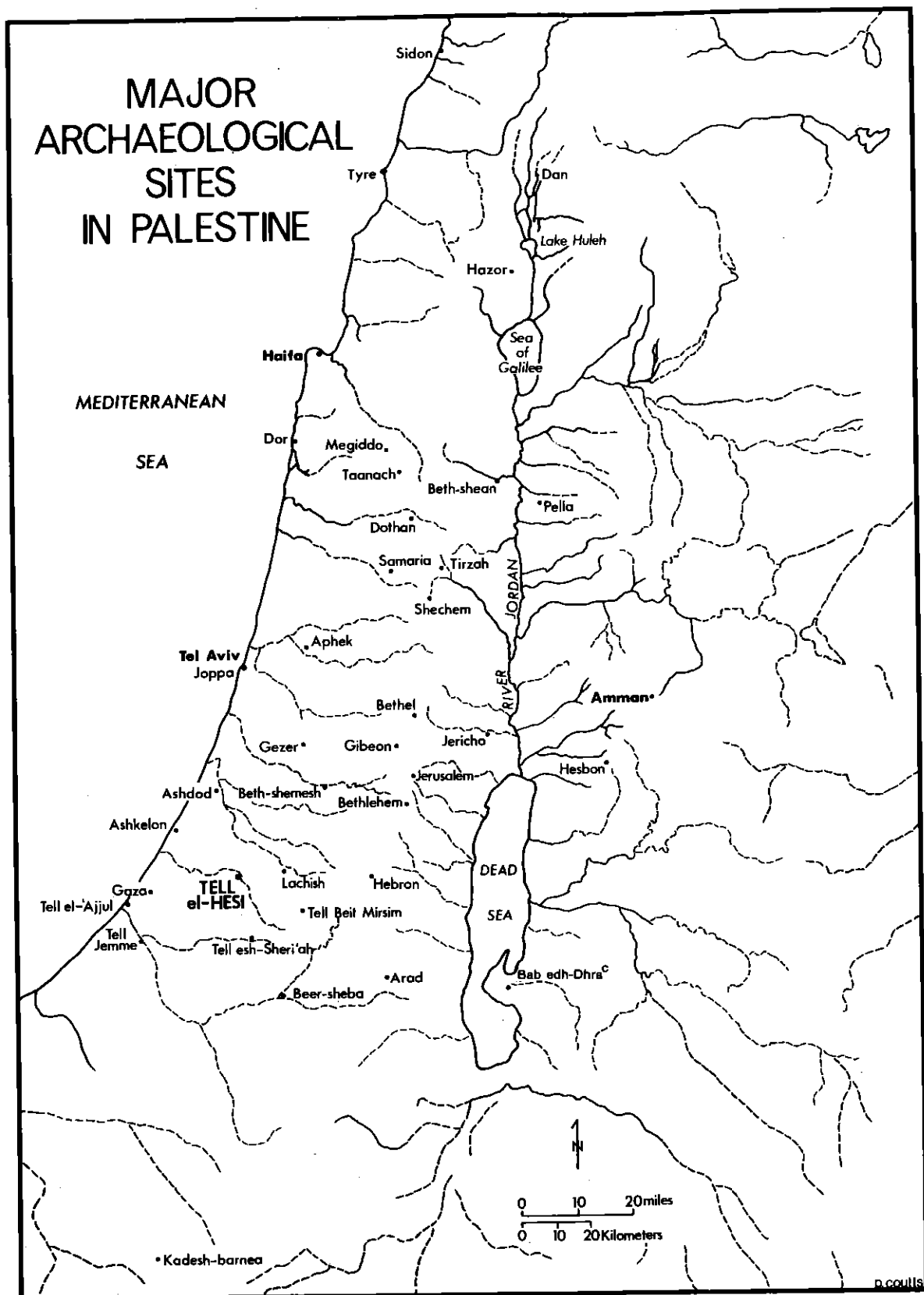
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# LIST OF ABBREVIATIONS

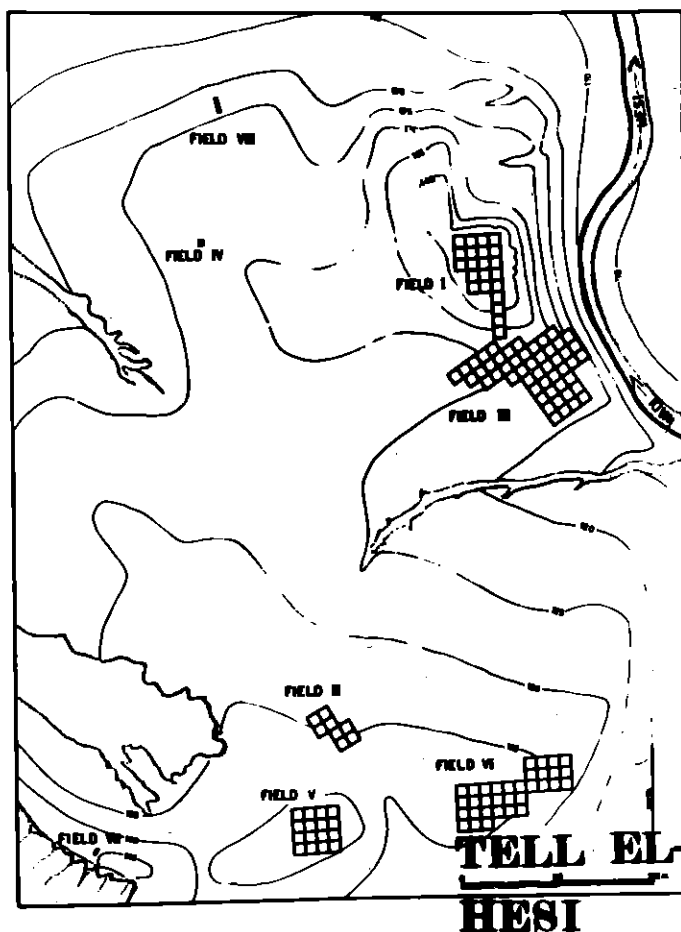
A	articulated (skeleton)	Mal.	shell (including snails)
Aeg	Aegean	MB	Middle Bronze
Ar.	artifacts, objects	MB 1	Middle Bronze I
Arab	Arabic	MB 2	Middle Bronze II
Ass	Assyrian	MC	material culture
Bot.	botanical (remains)	MCR	material culture registry
bs	body sherd	mm	millimeter
Byz	Byzantine	mod	modern
C	to be coded	mort	mortaria
ca.	circa	mo(s).	month(s)
Chal	Chalcolithic	Myc	Mycenaean
cm	centimeter	N	North
Cyp	Cypriot	na	not available
D	Disarticulated bones; or to be drawn	NA	neutron activation
Dispo.	disposition	NE	Northeast
E	East	no(s).	number(s)
EB	Early Bronze	nr	not recorded
EB 1	Early Bronze I	NR	not registered
EB 2	Early Bronze II	ns	not saved
EB 3	Early Bronze III	NS	North-South
EB 3A	Early Bronze III-A	NW	Northwest
EB 3B	Early Bronze III-B	OR	object registry
EB 4	Early Bronze IV	Osteo.	human and animal bones
EW	East-West	Ot	other
ext	exterior	PA	articulated partial(skeleton)
fig(s).	figure(s)	Pers	Persian
freq	frequency	Phil	Philistine
Geol.	geological (samples)	PR	pottery registry
Hell	Hellenistic	R	to be registered
H70(etc)	Hesi and year	Rom	Roman
I.D.	insufficient data	rt	right
imp	import	S	South
int	interior	SE	Southeast
Iron	Iron	Spec.	specialist('s, s, s')
I 1(etc)	Iron I (field form only)	SW	Southwest
km	kilometer	ua	unassigned
LB	Late Bronze	ud, UD	undetermined
LB 1	Late Bronze I	UK	unknown
LB 2	Late Bronze II	ur	unregistered
LB 2A	Late Bronze II-A	UR	Unreported
LB 2B	Late Bronze II-B	US	unstratified
lt	left	Vt	vertical
m	meter	W	West
m	square meters	yr(s).	year(s)



Map of Palestine showing the location of Tell el-Hesi in relation to ancient and modern sites. Drawn by P. Coutts.

## EDITOR'S PREFACE

Tell el-Hesi is on the southeastern margin of the coastal plain, 23 km from the Mediterranean, 26 km northeast of Gaza, and 7 km southwest of Qiryat Gat. Occupying a series of sand dunes on the west bank of the Wadi Hesi (Nahal Shiqma), the site comprises a 25-acre walled city from the Early Bronze III period (see Appendix II) with a small acropolis in its northeast corner. Originally a sand dune 16.7 m high, the acropolis has been more than doubled in height by 21 m of occupational debris. The present summit of the acropolis has an area of 0.49 acres, as compared to 0.69 acres prior to the removal of Bliss's cut at the end of the last century, while its base occupies some 3.92 acres. While the entire site was abandoned before the end of EB III, the acropolis was occupied again, apparently before the end of the Late Bronze Age, and remained in more or less continuous use down into the Hellenistic period. There may have been some LB occupation on one of the southern ridges or elsewhere on the larger site, as well. After another period of virtual abandonment for many centuries, the acropolis and the southern dune ridge served for some time as a Muslim cemetery. Another period of abandonment was ended by modern military trenching in the mid-twentieth century.



Contour plan of Tell el-Hesi showing the location of fields at the conclusion of the 1979 season. The northeastern acropolis is at the upper right, to the left of the Wadi Hesi, with Field I on the summit and Field III along the southern base. Fields VII, V, and VI are situated from the west to east along the southern ridge of dunes that marks the perimeter of the EB III walled city. The corner of the acropolis north of Field I was removed by Bliss 1891-92. Drawn by R. Spytek.

Although too far inland to control the coastal highway from Egypt, Hesi could watch over the internal road system. A branch of the coastal highway turned east near Ashkelon and passed 2.5 km north of Hesi. Together with its smaller flanking neighbors, Tell Quneitira (or Qeshet) and Tell Sheqef, Hesi was in a position to dominate this route, as well as the southern approaches to the Shephelah, and to allow observation from a distance of the coastal road itself.

Tell el-Hesi was the first Palestinian site at which the principals of ceramic chronology and of stratigraphic excavation were applied and at which the relationship between pottery and stratigraphy was shown to be significant. In 1890 W.M. Flinders Petrie excavated at Hesi for six weeks and produced a general picture of its occupational history. Since the summit of the acropolis had been under cultivation, Petrie could only probe along its slopes, but in 1891-92 F.J. Bliss was able to excavate on the top of the mound. Excavating stratigraphically through each successive level to virgin sand, Bliss removed nearly the entire northeastern third of the acropolis. The resultant "cut" has been a distinguishing feature of Hesi ever since. Bliss identified eleven occupational levels which he grouped into eight strata or "cities."

The Joint Archaeological Expedition to Tell el-Hesi, sponsored by the American Schools of Oriental Research and a consortium of educational institutions, entered the field in June 1970, following a brief survey of the site in 1969. Subsequent seasons have taken place in the summers of odd-numbered years, with the sixth and most recent occurring in 1979. Major objectives of the modern project have been to investigate in greater detail and with more refined methods the stratigraphic divisions identified by Petrie and Bliss, to employ an interdisciplinary approach including the contributions of scientific specialists at all levels of the enterprise, and to provide a carefully structured educational experience for participating volunteers.

*The Tell el-Hesi Field Manual* appropriately appears as the first volume in the Joint Expedition's series of final publications under the auspices of the American Schools of Oriental Research. While owing much to the field experiences of the earlier Shechem and Gezer excavations and also deriving in part from co-author Toombs's earlier field manual for the Pella Expedition, the present work is primarily the result of many experiments and continued refinement through the past six seasons of excavation at Tell el-Hesi. The original form of the manual (1971) was designed as a guide to field excavation only and did not discuss the recording process. It was in effect a revision of the Pella manual. The Hesi manual was revised and expanded in the light of the experience of the 1973 season. After the fourth season (1975) the present form of the manual began to take shape as a document intended to reflect the Joint Expedition's organization and methodology at the end of its self-designated Phase One. The manual was updated after the 1977 season and used in a preliminary edition during the 1979 field season. The present publication has been revised in the light of numerous comments from staff and volunteers throughout the entire process and especially during the 1979 season.

The reader will find that the manual is not simply a "how to" book, but serves also as a carefully developed self-definition by an expedition whose staff has continually tried to combine the best of modern archaeological methods with a deliberately interdisciplinary approach to excavation and subsequent analysis. This has not always been an easy path to follow, and there have been numerous false starts and unintended detours along the way, but the Joint Archaeological Expedition to Tell el-Hesi remains committed to the designation "joint" in its title, not just as a description of its sponsorship, but even more as its style of operation on all levels. Subsequent volumes in this series and future seasons in the field will attempt to reflect the standards outlined here and develop their implications more fully. This manual is not presented as a final statement, but as a description of present practice and a base for further progress.

Already in 1974 the Hesi staff had begun to regard the first four seasons in the field (1970-75) as a working unit for publication purposes. It would include the five upper strata excavated on the acropolis (modern military trenching, Muslim cemetery, Arabic agricultural remains, Hellenistic levels, and Persian levels) and the three-stage wall along the southeastern base of the acropolis (provisionally dated to the Persian period, but possibly an Iron II construction). Phase Two, beginning in 1977, would then focus on the Iron Age remains on the acropolis and the Early Bronze III structures along the southern perimeter of the 25-acre walled city. Provisional assignment of volumes within the Phase One publication series was progressively refined, most recently by the decision to move this manual into position as Volume One. Volumes Two (a study of the modern military remains and the Muslim cemetery on the acropolis by L.E. Toombs) and Three (an analysis of the structures and stratigraphy from the Persian period by W.J. Bennett, Jr.) have both been completed and will appear in the near future within this series. A further volume of essays on specific aspects of the site and the expedition's work during Phase One is largely completed and will probably appear fourth in sequence, to be followed by further volumes at a somewhat later date.

The work of the Joint Expedition would not be possible without generous contributions of time, energy, and financial resources from many individuals and institutions. First and most important, although they cannot be listed individually here, are the many dedicated archaeologists, scientific specialists, and others who have served for varying periods of time on the Hesi staff, together with the hundreds of students and others who have come to join us in the field as members of the volunteer and educational program. Both staff and volunteers have served at Hesi at great personal expense, and their shared spirit of generosity and dedication to a common task has done much to make a difficult and often tedious operation exciting and attractive. The countless hours of contributed services in and out of the field, the travel costs paid by so many participants, and the hefty volunteer fees since 1973 together constitute the largest contribution to the total Hesi budget. Without that contribution, neither this manual nor the Hesi operation itself would have been possible.



The second major source of support for the Hesi expedition has been the financial contributions from the academic institutions comprising the Hesi consortium for one or more seasons. In addition to Oberlin College, which has been a member of the consortium from the first season to the present and has provided the administrative base for the volunteer program, the following institutions have been consortium members for the seasons indicated: Ashland Theological Seminary (1973), CHERS: Consortium for Higher Education--Religious Studies (1975), College of Holy Cross (1975, 1977), General Theological Seminary (1973), Hartford Seminary Foundation (1970, 1971), Oklahoma State University (1979), Seabury-Western Theological Seminary (1973, 1975, 1977), Smith College (1975, 1977, 1979), The Protestant Episcopal Theological Seminary in Virginia (1975, 1977, 1979), Trinity Lutheran Seminary (1975, 1977, 1979), Wake Forest University (1977, 1979), Wartburg Theological Seminary (1979), and Wilfrid Laurier University (1973, 1975, 1977, 1979). Many of those institutions also made financial and other contributions to the work of the Joint Expedition either in addition to their consortium payments or for seasons during which they were not consortium members. In particular, Wilfrid Laurier University has generously provided staff time, equipment, and archival facilities for the expedition's photographic work, and has made its computers available for analysis of data and for manuscript preparation (including the production of this manual in camera-ready form). Other institutions also providing support to the Joint Expedition for one or more seasons include Christian Theological Seminary, EARTHWATCH: The Center for Field Research, Golden Gate Baptist Theological Seminary, Harvard Divinity School's Research Team for Religion and Culture in the Aegean in New Testament Times, Harvard Semitic Museum, Phillips University, and Weston School of Theology.

Further major support was received by way of grants from The Smithsonian Institution (1970-73), The National Endowment for the Humanities (1973-76), and the Canada Council (1971). In addition, a number of contributions were received from private donors each season. For all of this important financial support and the encouragement which it has brought with it, the Joint Expedition expresses public thanks.

It is appropriate to thank here the successive Directors of the Department of Antiquities for the State of Israel, Avraham Biran and Avi Eitan, and their staffs for their constant encouragement and ready assistance over the past six seasons. The directors (David Noel Freedman, Robert J. Bull, William G. Dever, Eric M. Meyers, and Albert E. Glock) and staff of the Albright Institute of Archaeological Research in Jerusalem have always provided a warm welcome and much appreciated workspace during the summers in the field. In recent years the Pontifical Biblical Institute in Jerusalem has made crucial storage space available to the Joint Expedition between seasons, and its genial superior, Father Francis Furlong, S.J., has made many of the staff feel welcome within its walls. Our technical men from Balata, Nasser Diab Mansur (Abu 'Issa) and Jabber Muhammad Hasan (Abu 'Abid), have made notable contributions in the field and have been our most valuable

instructors. Samir Khayo of Beit Hanina has helped in many ways with the successful operation of the tent city at the site. Many other residents of Jerusalem, the West Bank, and the Qiryat Gat region have served in support positions in the field or have provided us with advice and assistance in other ways. Even though we cannot list all their names here, each is remembered with gratitude and respect by Hesi personnel.

It now remains only to thank those whose contributions to this manual have been direct and particularly important. Its present form owes much to comments and suggestions from John E. Worrell, the first director of the Hesi Expedition, D. Glenn Rose, the expedition's current director, and various members of the Hesi staff, notably W.J. Bennett, Jr., Michael D. Coogan, James F. Ross, and Miriam D. Ross. Special thanks are also due to Valerie Abrahamson, W. Elizabeth Craven, and Noreen O'Leary, who typed major parts of the version that was used in the field in 1979. In a very important sense, all those who have served in the field at Hesi, whether on the staff or in the volunteer program, have made their contributions to the present work. They will recognize much here that is due directly to their personal comments, suggestions, or questions during past seasons. Except where otherwise noted, all figures are the work of the authors. Any deficiencies that remain are the sole responsibility of the authors and editor.

It is to all Hesi-ites, both past and present, with affection and gratitude, that the authors and editor join in dedicating this present field manual.

Kevin G. O'Connell, S.J.  
Cambridge, Massachusetts  
22 April, 1980

## CHAPTER ONE: INTRODUCTION

An archaeological expedition comes into existence neither quickly nor spontaneously. It requires months or years of detailed planning before work in the field can begin, and an even longer period of sustained work to prepare the results of the completed excavation for publication. At the inception of an archaeological project much time is expended in locating a suitable site and obtaining permission to excavate, in securing the funds required to operate the project, in gathering a competent and congenial core staff, and in determining the overall objectives and priorities of the expedition. After the preliminary organization, the operations-management phase of the project includes general management, re-evaluation of objectives and priorities, formation of excavation policy, and planning for the publication phase.

The excavation phase involves decisions concerning the excavation methods to be employed and the structure, operation, and implementation of the recording system. It also includes the detailed funding of the particular season, the determination and appointment of the field staff required, the selection of the volunteer staff, the acquisition of the seasonal permit, liaison with the responsible archaeological authorities of the country, and the settling of innumerable details of camp management, equipment, food supply, sanitary conditions, and transportation. All these concerns, and many more, must be coordinated to function during actual excavation in order to approximate the goals set in the operations-management phase.

The publication phase is not an addendum to the archaeological process. It is, in fact, the goal toward which the operations-management and excavation phases have been directed. It involves the complete publication of the findings of the excavation. This should be done as quickly as possible after the completion of each coherent segment of the excavation, so that information is not lost and so that the results of the excavation are disseminated rapidly.

Fig. 1 shows the three phases of the expedition's work in their relationship to one another. Long-range planning, the setting of overall goals, and administration occur in the operations-management phase. Short-range goals are set and the excavation itself takes place in the excavation phase, with the findings in this phase influencing operations-management decisions for future seasons. The publication phase is the offspring of excavation, and has a reflex influence on both the operations-management and the excavation phases. Fig. 2 portrays the major aspects of the excavation phase, and illustrates the function of this manual in the overall structure of the expedition. The lined areas -- excavation methodology and recording methodology -- are those aspects on which this manual focuses.

The manual, as presented here, is the end result of a series of experiments with, and changes in, the procedures of the expedition since it began in 1970. Prior to the 1970 season a manual was prepared, more or less *in vacuo*, for the use of the supervisory staff. The methodology

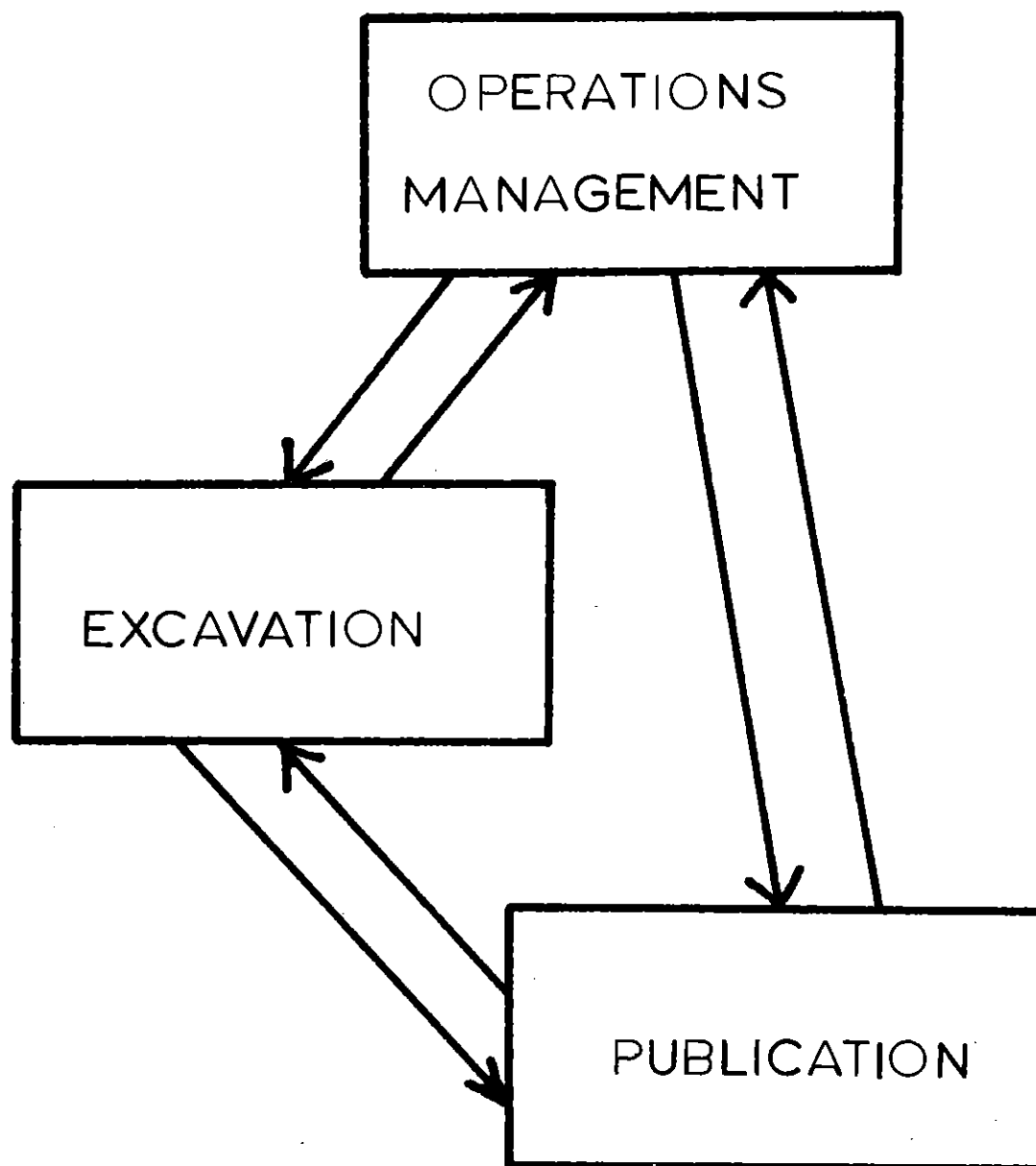


Fig. 1. The three phases of a total archaeological expedition

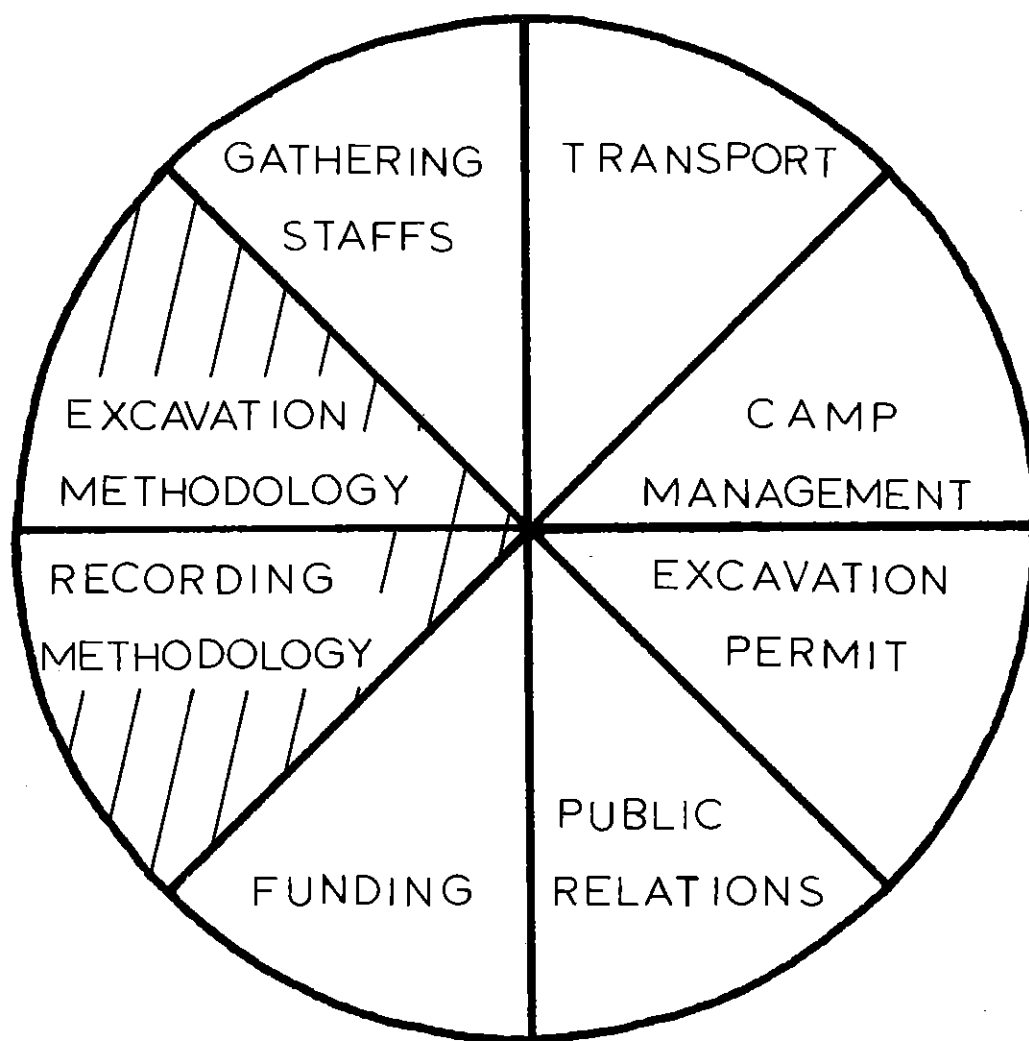


Fig. 2. Aspects of the excavation phase of an archaeological expedition; the lined areas are covered by this manual

represented in that initial manual strongly reflected field methods developed at Shechem and those then in use at Gezer, as described in handbooks prepared by H. Darrell Lance and Joe D. Seger. Its immediate ancestor was, however, a field manual prepared by Lawrence E. Toombs with the close cooperation of Robert H. Smith for use by the Pella Expedition. The present form of the Hesi manual modifies and enlarges the treatment of field excavation contained in the original Hesi manual, and incorporates the changes in procedure and method developed over the six seasons in which the expedition has been in the field. The original manual did not deal with the recording process. Two major sections (Chapter 7: *The Field Laboratory* and Chapter 8: *Specialists*) have, therefore, been added to cover this important aspect of field work. Chapter 7 owes a great deal to the efforts of Jack and Mary Bennett, who developed the Material Culture Registry (see Bibliography) on which the system of recording non-ceramic evidence is based.

This manual is intended for use in five different ways by five different audiences. First, it is directed to the volunteers who take part in the field excavation in order that they may better understand the reasons for the apparently overly meticulous and time-consuming techniques of digging and recording which they are called upon to follow. This is of particular importance for an expedition such as the one to Tell el-Hesi, whose philosophy and actuality are those of a volunteer dig with a structure which exposes many interested students to archaeology and archaeological method. Such a structure has the disadvantage that each season a new group of volunteers must be trained. It is hoped that this manual will be a significant part of the on-going training process. Second, it is intended to give the area supervisors a detailed guide to their field responsibilities and practical directions for carrying them out. Third, it is designed to specify the responsibilities of the senior supervisory staff in relation to the area supervisors and to the work of the expedition as a whole. Fourth, it is intended for anyone interested in the development of an efficient and integrated system of excavation and recording for use on a multi-level site. Fifth, and finally, it is presented for those scholars who may wish information about the methodology employed by the Hesi expedition either for its own sake or as an aid to the study of the expedition's final reports.

## CHAPTER TWO: GENERAL PRINCIPLES OF EXCAVATION

### *Objectives of Excavation*

The prime goal of archaeological excavation is to recover the maximum amount of evidence bearing on the history of the site (the chronological or vertical interest) and on the successive civilizations which experienced that history (the cultural or horizontal interest) within the specific objectives set for the expedition. The key factors in the success or failure of archaeological excavation are the methods and abilities of the excavators. Since the act of digging destroys most of the evidence almost as soon as it comes to light, it is necessary for the excavators to use the best excavating technique available, to observe with the utmost care and objectivity the material as it is being excavated, and to be accurate and complete in the recording of this irreplaceable evidence. Thus, the three fundamentals of excavation are technique, observation, and recording.

In order to recover the successive occupational layers as discrete entities, the excavator seeks to dig the site level by level. The simplest method of doing this would be to uncover entirely the uppermost cultural phase, record it completely by every applicable means, and then proceed to the level below, where the process of excavation and recording would be repeated. Thus the entire site could be studied level by level and, at least in theory, rebuilt from the topmost layer of the site down to the bedrock or virgin soil, since each level was kept separate during the excavation process.

A multitude of factors prevents the realization of such idealized results. Ancient cities are not built on horizontal planes. Hills and ravines, watercourses, ditches, terraces, and building activities of later periods cut across the site and make the precise separation of levels a task of the greatest difficulty. Furthermore, excavation continues at differing rates on different parts of the site, so that early levels may be reached in one area while another area is just being opened. The magnitude of most sites means that for financial reasons extensive portions cannot be excavated at all. To complicate matters even further, much of the evidence vital to a comprehensive interpretation of the site is contained not only in the occupation phases, but also in the intervening earth layers connecting these phases. Typical examples of such layers are destruction debris, wash over a disused building, fill brought in to level a site, or make-up layers under floors. It is knowledge of the contents of these soil layers, of the process by which they were deposited, and of the use to which they were put that allows modern excavators to unravel the history of the site and to determine the nature of its culture at each successive period.

The objective of the archaeologist is to identify and record every layer that is present in the soil, whether it be occupation, fill, humus, or dung. The excavators may not excavate each layer *in toto*

successively, but, however they proceed, they must be able to reconstruct each layer as a separate unit, recording its contents and its relationship to the other layers that surround it. Only with this information in hand can the excavator attack the problem of interpreting what has been found. This should not imply that excavation and interpretation are two distinct and separate tasks of the excavator. Rather, they should be performed simultaneously in a continuous process, recording what has been found as well as attempting to explain how and why each layer was laid down and how it fits into the history and the culture of the site as a whole.

### *Objectives of Field Recording*

The attempt to achieve the objectives of this type of excavation immediately raises the problem of proper recording technique. How can the excavator record all necessary information concerning each layer, keep it in a form that is readily accessible for reference during excavation, and have it provide valid and sufficient evidence for the complete publication of the site? To do this, both descriptive and spatial evidence must be recorded. The descriptive evidence indicates verbally the nature and contents of each layer. In order to place each layer in context, however, pictorial evidence showing the physical dimensions of each layer and its relationship to surrounding layers is needed. To describe a layer spatially a Cartesian coordinate system of three dimensions can be used. This requires two horizontal measurements (e.g., north-south and east-west) and one vertical measurement (normally the elevation above sea level). Through this method any point under excavation can be physically located. In practice, the plans provide the horizontal measurements and the sections the vertical coordinate. Taken together they uniquely describe any specific point.

A plan is a slice across the site, or some part of it, at one particular time in its existence. A plan is drawn to scale and shows all layers in horizontal relationship to each other. Two types of plan are produced during the excavation: top plans and phase plans. Top plans show the progress of the excavation. Each one is a map of the excavated area at a point in modern time during the excavation (e.g., on a particular day of the excavation season). Phase plans show all contemporary walls, surfaces, and other architectural features of a given occupational level. Each phase plan is thus a map of the excavated area at some one point in history. A sequence of well-conceived top plans shows every layer in the site as it was excavated. A series of phase plans illustrates the layout of the site at every occupational level. Taken together, the phase plans spell out the history of the site period by period.

The dimension that is lost with plans is the vertical. By carefully and laboriously correlating measurements, it would be possible to establish the vertical relationship of the plans, but the sections give this information in direct graphic form for both the top plans and the phase plans.



A section is a scale drawing of one of the sides of the excavated area. To be useful in providing vertical relationships it must be drawn from a vertical face (balk) cut to a plumb line. A section shows every occupational level and every soil layer visible in that face of the excavated area. Since the section cuts every plan at right angles, it provides a visible record of the vertical relationship of the plans to each other.

This principle of three-dimensional and descriptive recording is the basis of sound recording technique. In the ideal case, if every layer, every artifact, and every pottery sherd is related to a top plan and a section, and is adequately described, it is theoretically possible to place everything back into the site precisely where it was found in the course of the excavation. This allows the excavator, as well as later interpreters of the published results of the excavation, to review and refine conclusions drawn from the evidence.

In the preceding paragraphs two objectives of field excavation have been isolated. The first is the objective of layer to layer excavation, by which the excavator retrieves the maximum amount of material from the ground in a systematic fashion. The second objective consists of the basic records of the season's excavation in the form of top plans, phase plans, sections, and layer descriptions produced by the excavators in the field.

Over the course of the first seasons at Tell el-Hesi, an archaeological method has been devised that operates within the framework provided by the excavation and recording objectives just discussed. The techniques employed are based on the stratigraphic principles commonly known as the Wheeler-Kenyon method. These principles have been increasingly employed by modern excavators in Israel, with each expedition making its own distinctive modifications. The form of the method in use at Hesi was developed during and for the excavation of a major Near Eastern tell. It has proved to be a sound method for such an undertaking and provides enough flexibility that its basic framework could be applied on a modified basis to smaller sites, classical sites, or historic sites. In order to understand the Hesi method a standardized terminology is necessary. The definitions that follow are those in use by the expedition and employed throughout this manual.

#### *Definitions of Terms*

*Field* - A field is the largest unit of excavation and consists of a group of closely related, usually contiguous, areas. Fields are numbered with Roman numerals in the order in which they are opened, e.g., Field I, or simply I.

*Area* - An area is a subdivision of a field. Its size depends on the function which it is designed to serve. In clearance operations area sizes can vary widely, in order that areas may be kept in a meaningful relationship to the structures being cleared. Areas are laid out as rectangles, because this simplifies the topographic relationships among areas, and, unless there are compelling reasons to the contrary, as six-meter squares. Areas are designated by Arabic numbers; thus Area 1 or just 1 (see fig. 3).

*Area Supervisor* - An area supervisor is responsible for one area. This person is responsible for the planning and execution of the day-to-day operations in the area and the recording of all evidence gathered there.

*Field Supervisor* - A field supervisor is responsible for the overall operation of a field. This person determines the strategy to be followed in the field as a whole, and then counsels the area supervisors on methods to be employed to implement that strategy. A field supervisor will typically supervise a field containing four to seven active areas.

*Locus* - Locus is the term employed for any layer or feature which appears in an area. Examples of loci are soil layers, walls, surfaces, or pits. Locus numbers are given to three decimal places (starting with .001) and are attached to field and area numbers. Thus, I.61.093 means Field I, Area 61, locus 093. The recording of observations by locus numbers is the basic device by which an area supervisor keeps an orderly area notebook. It must be added that most loci are real structural or architectural features, but that artificial loci also exist. A common type of artificial locus is a probe. Probes are dug to try to solve problems of stratigraphic relationships and hence do not correspond to any single physical or structural feature of the area.

*Sealed Locus* - A sealed locus is a locus for which there is demonstrable stratigraphic evidence that all later material is excluded and that the locus represents a deposit which resulted from one activity during a single occupation phase.

*Feature* - A feature is a major coherent element of the ancient site, such as a room, a courtyard, a pit, or an industrial installation. A feature may be confined to one area, may extend to several areas, or may encompass an entire field. Features are by their nature field concerns, and their identification and numbering are the responsibility of the field supervisors. Features are identified on plans by an area and locus number enclosed in a circle and accompanied by a descriptive word, e.g., (61.093)-room, and in prose by the descriptive word followed by the area and locus numbers, e.g., Room (61.093). The area and locus numbers chosen as feature numbers should indicate either where the feature was first seen or where the feature is best seen.

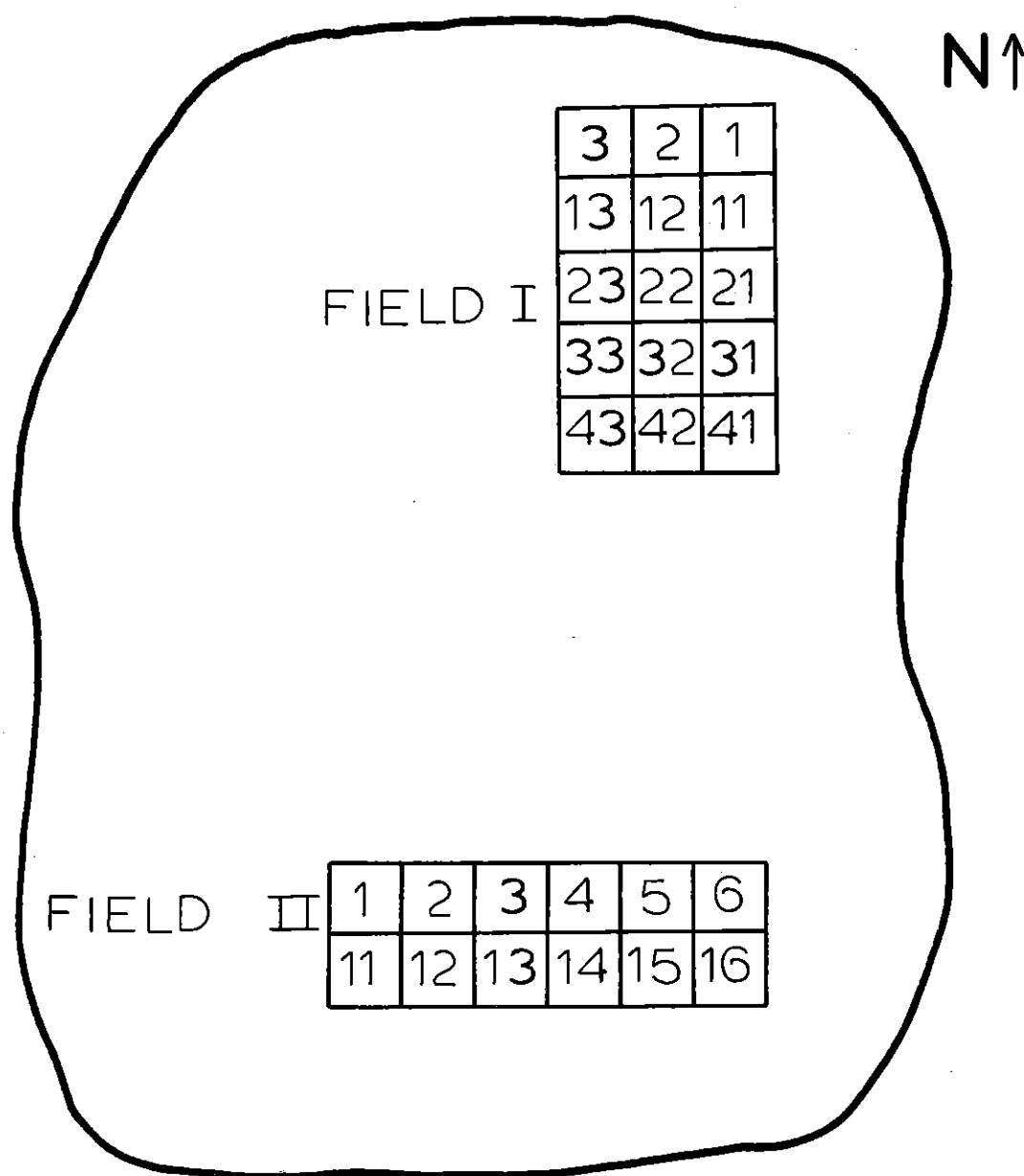


Fig. 3. Schematic diagram showing a site with two fields and their component areas

*Structure* - A structure is a group of features which, taken together, form a major architectural unit of the field in one of its phases, such as a house, a cemetery, a road, or a water system. Structures are identified on plans by a structure number enclosed in a circle and accompanied by a descriptive word, e.g., ④-house, and in prose by the descriptive word followed by the structure number, e.g., House ④. Structure numbers are assigned by the field supervisor in sequential order for that field. Loci are grouped as features and features are grouped as structures.

*Layer* - This term does not enter into the recording procedure, but is so frequently used that a definition is desirable. It is reserved for expanses of soil distinguishable from one another by color, texture, or content. In the normal process of recording, a layer will receive a locus number.

*Balk* - A balk is a strip of unexcavated earth, usually one meter wide, that separates areas within a field. A balk is made up of the outer 0.50-meter strip of each edge of each area (see fig. 4).

*Stratum* - Stratum is an inclusive term for a series of layers which, taken together, represent a continuous period of occupation during which there were no major structural or cultural discontinuities. A stratum is usually marked at its beginning and end by radical changes in stratigraphy such as, for example, destruction layers which involve the whole site. Strata are designated by Roman numerals assigned in order from the most recent stratum encountered, e.g., Stratum I, Strata IV-V.

*Phase* - 1) The term phase is used to designate constructional or occupational levels during excavation and subsequent study, up to the point where stratum numbers can be assigned. Thus EB, phase 1, EB, phase 2, etc. may be employed until the EB stratification and its relationship to the earlier and later strata are determined.

2) Phase is also used for a subdivision of a stratum distinguished by a minor or local disturbance in the structural or cultural continuity significant enough to require designation, but not significant enough to justify assignment of a new stratum. The term sub-stratum is also used as a synonym. Phases are designated by lower case alphabetic characters beginning with "a" for each stratum. Thus Vb would mean Stratum V, Phase b, or the second phase of Stratum V.

*Period* - Period designations employed in Palestinian archaeology have been worked out on the basis of pottery chronology as the composite result of many excavations, and all excavators should be familiar with the main outlines of the system (see Appendix 2). These period divisions may correspond to the strata and phases at any particular site, but such correspondence is neither inevitable nor automatic. The coordination between the stratigraphy of the site and the ceramic chronology of the region is a major subject of post-dig study.

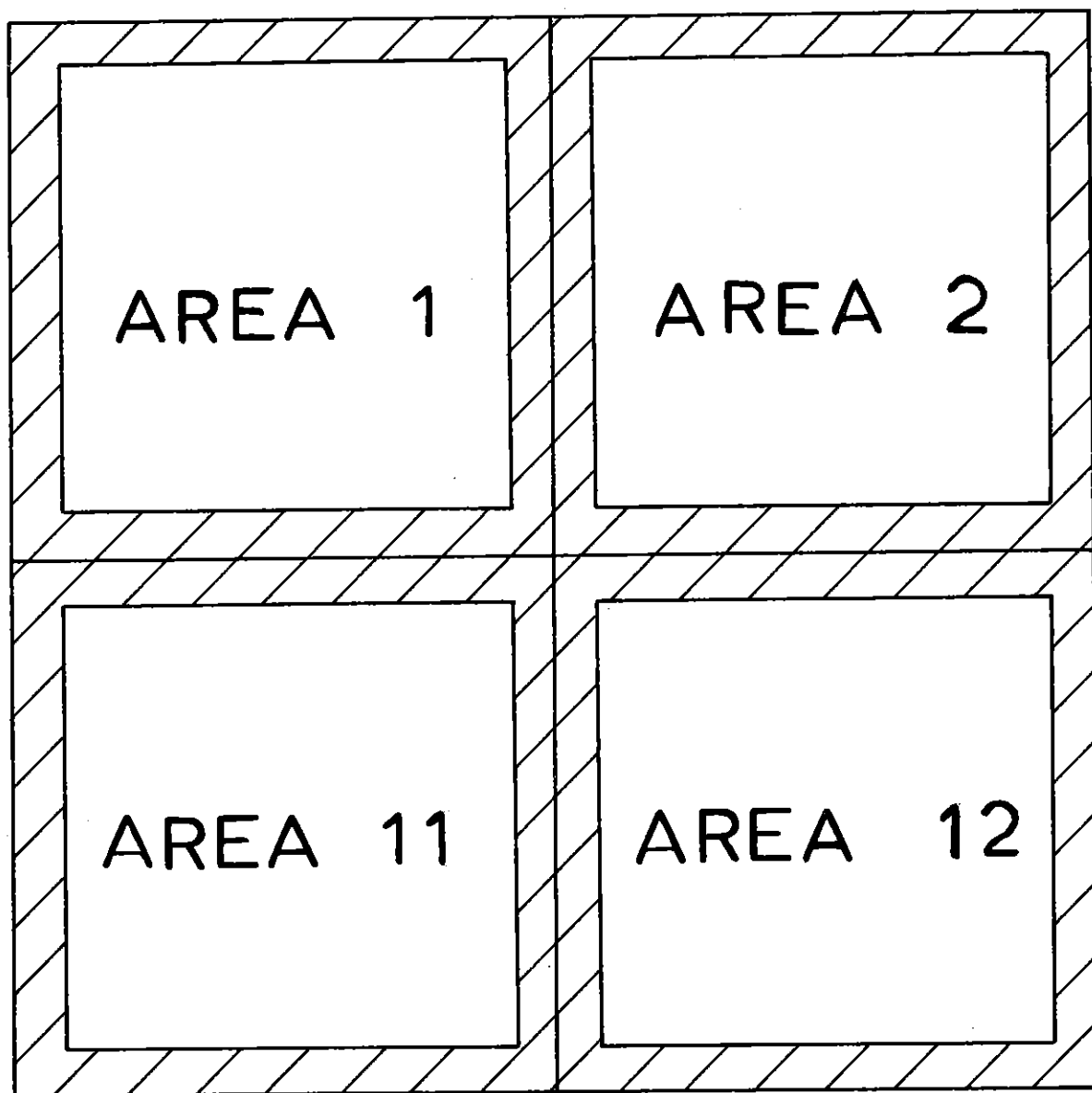


Fig. 4. Schematic layout of a field of four areas with the hatched strips representing the balks.

*The Field and Area System*

The smallest and most important unit of excavation is the area. It is in the area that all excavation and recording occurs. The size of an area must be such that the area supervisor can accurately control its excavation and record all loci and artifacts as they are found. A 6.00 m x 6.00 m square, of which only the center 5.00 m x 5.00 m portion is initially excavated (fig. 4), allows the area supervisor to observe everything happening there. Besides simple observation, the area supervisor can direct and properly record the activities occurring in an area of this size, and can instruct his or her staff in the techniques and strategies to be used in the excavation. Reference points are available, and near at hand, for recording purposes. Once the corner points of an area are established (before the excavation begins), it is possible to pinpoint easily any locus or artifact on a top plan. Along with drawn balk-sections, top plans provide the three-dimensional reference points necessary for control purposes.

In actual excavation, the field is an unnecessary concept, since all earth removal and recording occurs in the areas. The field, however, is a useful unit for supervisory and reporting purposes. The field concept was created to aggregate areas into meaningful and reportable units, since contiguous areas usually exhibit nearly identical stratigraphy and features. As a unit, the field can be expanded in any direction through the addition of new areas to facilitate further study of any feature or phase that may be isolated. The field supervisor should be an experienced archaeologist who has knowledge of previous work at the present and related sites. The duties of the field supervisor include determining overall strategy for the field, reporting the results of operations in the field, and providing advice and counsel for area supervisors especially on problems of excavation and interpretation as they arise.

The advantages of the field and area method of archaeology over previous methods, such as massive clearance, trenching, and tunneling, are many. The least of the advantages of this method is that it makes unnecessary the carrying of loose earth over parts of the site previously excavated. The greatest advantage lies in its superiority in recording, supervision, and reporting. In methods employing many people working over large unbroken areas, major problems of supervision and control inevitably arise. The sheer bulk of material coming from many different contexts creates problems of recording and interpretation. Maintenance of three-dimensional control in a large clearance is very difficult, since both vertical and horizontal reference points are not near at hand.

The actual decisions as to where to dig, overall strategy, and systematic techniques to be applied are the responsibilities of the director of the expedition and the senior archaeologist. The director of the expedition is most concerned with the overall structure and objectives of the dig. This person coordinates the personnel

(supervisors, specialists, and volunteers), gets them to the field, and endeavors to keep the dig within its budget and time limitations. Control and supervision of financial matters is in the hands of the administrative director of the dig (see Appendix 3). The archaeological program is directed by the senior archaeologist who is responsible for the overall and specific archaeological objectives and for the coordination of specialists to meet these objectives. Usually a large share of the publication responsibilities falls upon the senior archaeologist. Together, the director of the expedition, the senior archaeologist, and the administrative director discuss problems in excavation strategy as they relate to time and money.

An important aspect of the Hesi method is the educational volunteer program. Most of the actual labor comes from volunteers, working not just as dirt carriers, but as a part of their educational experience. One of the prime duties of the area supervisor, therefore, is teaching volunteers the techniques of excavation, observation, and recording. Five or six volunteers are assigned to each area supervisor for this training. For the most part, they work with the area supervisor for the entire season. Fig. 5 outlines the organization of the field excavating staff.

#### *General Archaeological Techniques in Excavation*

During the course of an excavation many situations and problems will arise which must be dealt with *ad hoc* by the supervisor on the basis of his or her knowledge and experience. All problems cannot be anticipated in advance, but some basic techniques and theories will be reviewed here.

*Area Equipment and Its Use* - Each area is provided with its own set of excavation tools. These are taken from the storage space in the morning and returned in the evening. The area supervisor should check the inventory morning and evening to make sure that nothing has been lost, stolen, or left in the area.

An area's equipment consists of: one wheel-barrow, four broad-bladed hoes, two large picks, four small hand-picks, five mason's trowels, two short-handled straw brooms, two soft-bristled brushes, two whisk brooms, two paint brushes, four metal dustpans (plastic breaks too easily), three or four dental picks, several spoons, a hand-blower resembling a kitchen baster, ten plastic pails for pottery, ten rubber baskets for earth removal (they are made locally from old tire casings), a supply of cardboard boxes of various sizes and of plastic and paper bags for material culture samples, and six pairs of work gloves. The drawing and recording equipment for the area is kept in the area supervisor's kit (see pp. 61-62).

Equipment used in common among several areas includes: dry sieves, flotation tanks, ladders of various lengths, hoists, chains, ropes, block-and-tackle, and metal mauls for breaking stones. The distribution

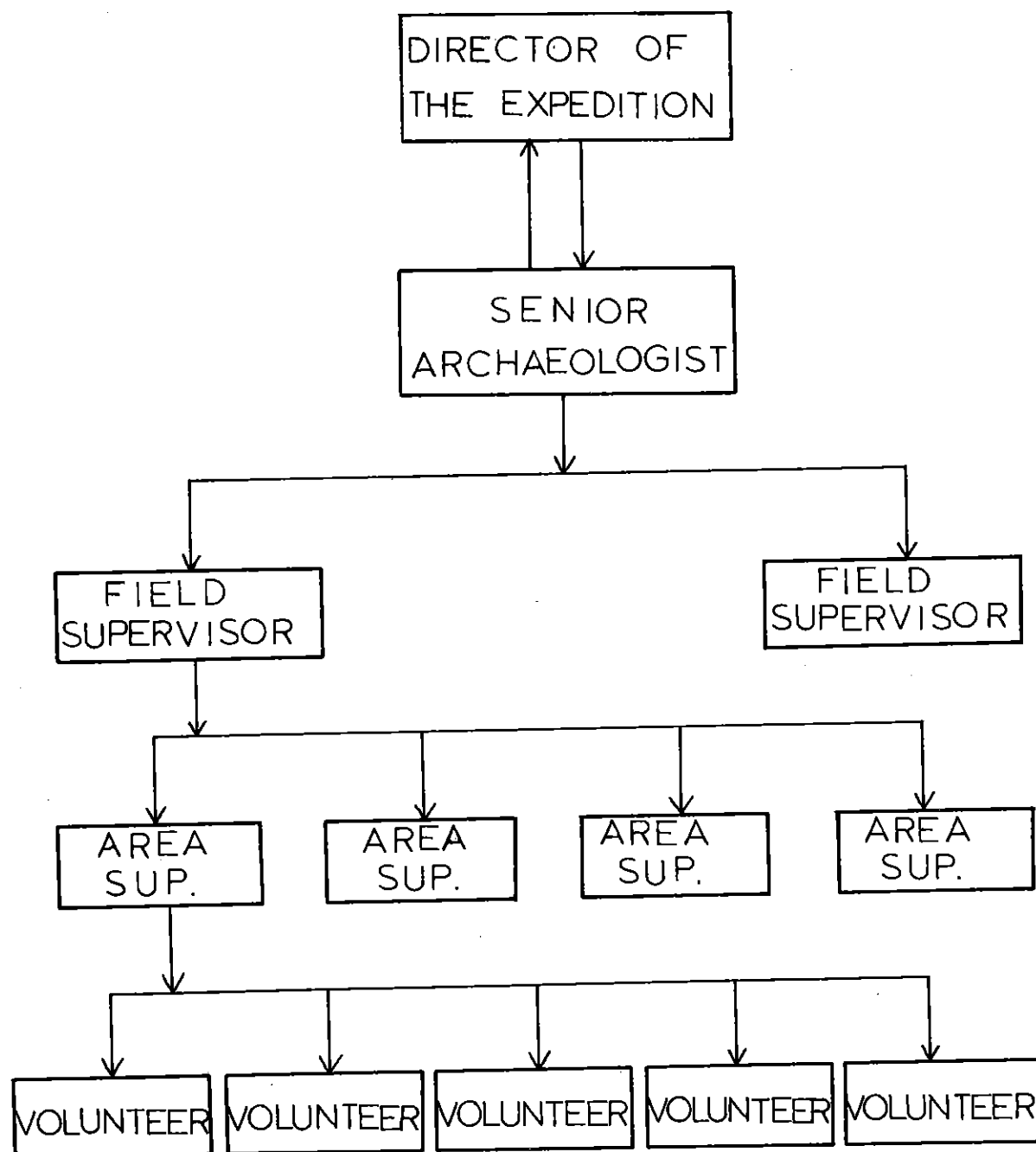


Fig. 5. The lines of responsibility of the excavating staff



and use of this equipment is determined by the field supervisors in consultation with the camp manager (see Appendix 3).

The repair and maintenance of all equipment is under the control of the camp manager, and tools for this purpose are located in the camp workshop. Area supervisors are responsible for bringing damaged or inoperative equipment to the workshop for repair, and for drawing replacements from the general stores, so that the area's equipment is always complete.

Area supervisors should instruct their volunteer teams in the proper use of the equipment, and should quickly correct any improper digging technique or abuse of the tools.

The following are a few basic principles for the use of excavation equipment.

A working day is long and arduous, and trials of strength lead only to illness and fatigue. Consequently, wheelbarrows and baskets should not be heaped up, but filled so as to make a comfortable load. Wheelbarrow tracks from the area to the designated dry sieves, flotation tanks, and dump should be leveled and cleared of stones. All earth removal should be along routes determined by the area supervisor.

The large pick is used for the excavation of fill layers, when thorough probing has shown that they are deep and cover a large part of the square. A full round-house swing of the pick is rarely used, except where the layer being dug is very hard. A uniform swing in which the pick is raised about chest high and allowed to fall by its own weight generally gives the desired penetration of 3-5 cm. The picker works forward, carefully observing each clod of earth as it is loosened. The broad edge of the pick is used for layers of slight to moderate compaction, and the point for more compact layers. Used in this way, the large pick can be a sensitive digging instrument. When the swing is uniform, changes in the depth of penetration indicate changes in the consistency of the soil and suggest the possibility of a new soil layer.

Two persons with broad-bladed hoes follow the picker and scrape the loosened earth into rubber baskets. The basket should be placed on its side, between the feet and supported against the ankles of the hoer. The earth is pulled into the basket with a horizontal scraping motion. The hoer watches the earth closely for pottery and objects undetected by the picker. When the basket is full it is transported to the wheelbarrow by the individual who dug it, or along a basket line, or by a mechanical hoist. Earth-filled baskets should be passed from hand to hand, and not thrown from one person to another. The receiver may not be as strong as the thrower, and injury may result. In any event, the area supervisor will not appreciate a cascade of dirt in the clean square. Empty baskets should be returned promptly to the square, so that the movement of earth will not be slowed down. They should not be thrown back into the square, since they are easily damaged.

Picking is faster than hoeing, and the picker tends to get ahead of the earth-removal process, so that loose dirt accumulates in the square. When this happens, the diggers are working blind. The general rule is that the picker should never be more than three or four basket-loads of earth ahead of the hoers. When each pass across the space under excavation is completed, the area should be swept with the straw brooms, and the nature of the newly exposed surface examined with care before the next pass is begun.

In excavating thin earth layers, in digging probes, or in working near objects or structures the small pick and trowel are used. The small pick, like the large one, should be swung with a short uniform stroke, working away from the digger. The action is almost entirely in the wrist and the weight of the pick does most of the work. A penetration of two or three centimeters is desirable. The broad end of the pick is used, unless the soil is too hard to make this effective. Only a small amount of earth is loosened at a time. This is scraped with the trowel into a dust pan and, in the process, examined closely for its contents. The dirt is then transferred to the rubber basket. At frequent intervals the newly exposed surface is swept clean with the soft-bristled brush or whisk broom, and examined for any signs of change in the soil layer (see pp. 17-19).

Frequently even the small pick is too gross an instrument for the degree of control required by the digging conditions. In these cases the trowel and dustpan are used. In working with a trowel the cardinal sin is to dig with the point. This pock-marks the surface and obscures its features. The edge of the trowel should be used in a level scraping action toward the user. In this way a thin layer of earth is scraped off, and the surface appears fresh and clean. The earth removed by the trowel stroke is transferred directly to the dustpan. In trowel work the surface being scraped is constantly brushed clean with a whisk broom or small brush. When working near an object or structure, the trowel should never be drawn toward the object, for fear of damaging or displacing it. The trowel stroke begins near the object, and the earth is drawn away from it. Objects should be left in place until their removal is ordered by the area supervisor.

When working at the interface of two soil layers, whether with the small pick or with the trowel, the excavator should aim at a clean separation between the two layers. A brisk stroke with the small pick, oblique to the exposed surface, will often cause the upper layer to flake off from the lower. When the trowel is in use, very shallow layers are scraped off, with constant brushing, until the change in soil layers becomes clear. It is always preferable to excavate slightly into the lower layer rather than to stop short of the actual interface. Material from an earlier layer cannot confuse the dating of a later one, but, if material from a later layer is incorporated with that from an earlier, the date of the latter is falsified.

For the most delicate work, such as the excavation of bones or of small or fragile objects, a spoon replaces the dustpan and the blade of

a jack-knife or a dental pick replaces the trowel. The digger works away from the object, and constantly brushes away the earth as it is loosened. In the case of very delicate objects a hand-blower is used to blow the loose earth gently away. The dental picks, spoons and blower are kept in the area supervisors' kits (see pp. 61-62). The excavator should never dig a hole around an object, but should aim at exposing at the same time the object, the surface on which it rests and all the features contemporary with it. Hence, the excavated area around an object should be kept as nearly level as possible at all times.

Although not strictly involved in the use of tools, a few rudimentary safety precautions should be indicated. In lifting heavy objects, such as large stones, baskets of earth, or wheelbarrow handles, the lift should always be taken from straight in front of the body with the shoulders square to the object and the knees bent. This allows the weight to be taken by the legs as well as the back and arms, and goes a long way toward preventing muscle strain and injured backs. Sandals or bare feet are a menace in an area and have resulted in many a squashed toe or painful cut. Stout shoes or ankle-length boots are recommended. Work gloves should be worn, not only when handling heavy or abrasive objects, but when working in loose earth. Scorpions make their homes there, and their sting, although not fatal, is highly unpleasant. The hands should not be placed under a stone until it has been checked for scorpions.

Most of this manual appears directed to the work of the supervisors. It is important, however, that the volunteer staff be familiar with its contents. The first eyes to see newly exposed earth are those of the volunteer diggers. Unless they are both alert and knowledgeable, valuable evidence will inevitably be lost. The volunteer team should, therefore, know from the area supervisor's daily briefing what the excavation strategy for the day is and what are its aims. They should understand the tagging and labeling procedures used in the field (see Ch. 7), carefully check the tags on all containers which they are using, and report irregularities or errors promptly to the area supervisor. They should exercise the utmost care in placing pottery and objects in the proper containers. Any mixup will contaminate the whole container and result in the invalidation of potentially valuable evidence.

Above all, the volunteers should maintain and cultivate an inquisitive and inquiring attitude. They should not be content merely to dig, but should know the principles of stratigraphic excavation (see below through p. 27). They should ask themselves the "how" and "why" of the layers which they are exposing, and should not be afraid to pose such questions to the area supervisor or to offer their own suggestions as to interpretation. It goes without saying that any phenomenon which appears stratigraphically significant to the volunteer should be reported at once to the area supervisor.

*Excavation of Soil Layers* - During the excavation of a site, the surveyor can easily provide the supervisors with the elevation of any feature above (or below) sea level. By themselves, sea level readings

and readings of the depth below surface level, while valid in locating the physical position of a feature, are of no stratigraphic significance. The original contours of an ancient city were not level or even, and surfaces were broken by pits, intrusions, and many kinds of installations. The true stratigraphic sequence within a site is given by the relationships of the soil layers to each other. Characteristics of individual soil layers are color, compactness, texture, and contents. It is imperative to identify new soil layers as they occur. This can be done by noting all changes in soil colors, by continuously testing the hardness and texture of the soil and noting any changes, and by observing and noting the appearance of new ingredients, such as plaster bits, broken bricks, pottery, or stones, as they occur. As these components change, the soil layers also change, and this must be recorded. Volunteers should be trained to watch for these indicators and to inform the area supervisor what they have observed both visually and by touch. The area supervisor should note what has been reported and should test these findings by taking part in the actual excavation process.

The excavator attempts to remove the soil layers in the reverse order to that in which they were deposited. In the area under excavation, the whole of the most recent layer should be removed before the next lower layer is penetrated. This is done to minimize possible contamination and to clarify the results of excavation. It does not matter how much a layer slopes or how varied its thickness is, it must be removed and recorded as a single unit. Proper excavation technique is a careful process of following soil layers, and the worst mistake is to dig holes. The two apparent exceptions are the cases of trial trenches (see p. 19) and various types of pits. A pit is a hole made and filled by human agency, and should be excavated as an archaeological unit. A pit should be cleared to its bottom, no matter how deep it goes, and the contents should be recorded as belonging to the pit. A more detailed description of archaeological technique as it relates to pits is found on p. 23.

The most significant physical aspects of soil layers are their distinguishable limits. The interface between soil layers should be studied carefully. It may turn out to be only the separation between upper and lower fill layers, or it may be a living surface created by the site's ancient inhabitants, such as a floor, a courtyard surface, or a road. Walls are obvious features, sometimes even spectacular, and they tend to engage the excavator's interest. It was on surfaces, however, that ancient people lived, not on walls, and it is in connection with surfaces that the most crucial evidence will be uncovered. Consequently, the excavator should pay particular attention to the excavation and interpretation of surfaces.

Usually cobblestone or plaster living surfaces are quite distinctive and offer no difficulty to the excavator. Many living surfaces, however, are composed of beaten earth or very thin layers of crushed limestone. They are hard to recognize and are often manufactured by the excavator where no surface had actually existed. This is easy to do

merely by scratching a patch of hard earth until it is level and brushing it off. Authentic living surfaces have a meaningful relationship to the structures in the immediate vicinity, and can often be identified by their function. In addition, the presence of a surface is indicated by artifacts and charred bone lying on it, by pottery lying flat along the surface, and by the accumulation of dark organic layers or patches of ash immediately above it. The hand-pick will often reveal the presence of a surface, if the upper soil layer flakes off on a consistent plane when struck lightly with the hand-pick (see p. 16). When a surface has been identified, it should be followed carefully and cleared completely, and its functional relationship to the walls and features contemporary with it should be studied in detail.

*Trial Trenches* - Archaeology uncovers history in the reverse order to that in which it occurred. When an area is being opened for the first time or when an area has been cleared to just one phase, the supervisor has no way of knowing what lies below, since the later soil layers completely obscure all earlier phases. If, at this time of uncertainty, the supervisor excavates the whole surface of the area, an entire significant level may be dug through without its presence being recognized. Moreover, the evidence of a new level is often uncertain and ambiguous. If, under these conditions, the excavation extends through the entire area, all of the evidence will be lost or confused. Therefore, the supervisor sacrifices a small portion of the area in order to explore what lies below. In our terminology, this is a trial trench or probe. The use of a trial trench establishes the sequence of layers and allows the supervisor to remove each soil layer in an intelligent manner, in the proper order, over the entire area.

Trial trenches are dug from the layer which has just been cleared to the next coherent and interpretable layer which appears in the trial trench. In a supervisor's zeal to "get down," it is important not cut through an interpretable layer and go unnecessarily deep. A supervisor, therefore, should pay close attention to and take an active part in the digging of the trial trench. The proper positioning and size of a trial trench are essential if it is to be successful. The dimensions and location must be adjusted to the nature of the problem which the trial trench is attempting to solve. It is common, but not necessary, for the trial trench to be one meter wide and located against a balk of the area. In the absence of any other information, the trial trench will probably be cut through the highest point of an area that touches a balk, and go towards the lowest point in the area. This allows the greatest vertical coverage and increases the probability that valid information will result from the trial trench. One absolute principle of archaeological excavation is that the supervisor should never excavate over the whole area solely for the sake of "getting down." Judicious use of trial trenches will clarify any problem and allow proper excavation.

*Walls and Installations* - Usually the first indication of a stone wall is a single stone. A stone should not be removed until it is positively determined that it does not belong to a structure. If stones

are indiscriminately removed, an excavator may note their presence, but miss the fact that they combine to form a wall. As an added precaution against this mistake, the position of any substantial stone which is being removed must be indicated on the top plan of the area. This allows the excavators to recreate graphically, from the top plans of the area, a badly collapsed and robbed wall that may have been missed during the excavation.

Once it is determined that a stone wall is present, the excavators must be careful not to clear the face of the wall completely, for this method of clearance cuts all connections with the adjacent soil layers and floors, leaving the wall orphaned from its archaeological context and impossible to date. If the wall runs into one of the balks, these connections are automatically preserved. If this is not the case, the excavator must leave a balk of unexcavated earth connecting the wall, from its top course to its foundations, to the nearest permanent balk, and preferably at right angles to the balk. This *subsidiary balk* is prepared and drawn in the same fashion as a permanent balk (see pp. 28-33). When the presence of a wall is suspected, the best plan is to make a small probe at right angles to the presumed line of the wall. This allows the excavator to determine not only the direction and width of the wall, but also the relationships of the soil layers covering and surrounding it.

The excavation of mud-brick structures is much more difficult than that of stone structures. This is especially true when the bricks are unbaked, since the earth of which they are composed is virtually the same in color and texture as the surrounding earth. When a mud-brick structure collapses, the stump of the wall usually remains, but covering it and piled against it is a heap of broken bricks and brick dust, often mixed with plaster and charcoal flecks. As soon as a layer of this type appears, the supervisor should become doubly alert and look for the remains of a mud-brick wall *in situ*. The task is to disentangle the line of the mud-brick structure from the fallen mud-brick debris. Usually mud bricks *in situ* will exhibit slight differences in color and composition when compared with the fallen brick debris. Mud bricks may also contain orderly straw lines, while mud-brick debris will contain charcoal and plaster components. Brickwork is usually hard and more resistant to the pick than fallen debris and fill; consequently the latter will usually flake off at the wall line if struck obliquely with a hand pick. Often the wall line will show up more clearly if the soil is slightly dampened.

Once the line of the mud-brick wall is identified, its face must be cleared from the top to the associated floor. Here the same principles apply as in the excavation of a stone wall (for example, the maintenance of a balk), and the greatest caution is necessary in order to preserve any traces of plaster facing which may have been applied to the brickwork. When the wall has been cleared to its associated floor and brushed down, it will often be possible to discern the individual bricks of which the wall was composed. These bricks should be measured and recorded, and during the dismantling of the wall several whole bricks

should be saved. The sooner after excavation a photograph can be taken, the better, since brickwork often fades in color as it dries. Mud bricks and mortar lines dry at different rates; as they dry, crack lines appear. These cracks may reveal mortar lines that would otherwise go unnoticed, and should be recorded.

A wide variety of installations is invariably found during the excavation of a city site: wine and olive presses, hearths, bins, shelves, and benches. In their excavation common sense must rule, aided by a few general principles. Every feature must be related to a top plan and a section, and the digging technique must be adapted to this end. Under no circumstances should a hole be dug around the feature. In general, a probe should be made against it in order to ascertain if it is resting on a surface or if it is merely embedded in fill. When the main outlines of the feature are exposed a preliminary photograph may be taken, but the best photographic record will show the installation in relation to the surfaces and other features with which it is contemporary.

Remains of organic material, associated with structures or installations, are found in many contexts during an archaeological excavation. Organic material, including the wooden portions of buildings and structures, normally decays completely and leaves only a light-colored, typically off-white or gray, stain in the soil. The disengagement of such remains is extremely difficult work and must be accomplished millimeter by millimeter with a knife, a knitting needle, and a camel's hair brush or hand-blower. By this technique excavators at Jericho uncovered the outlines of reed mats on the floors of houses 9000 years old. Fragments of roofing material may be recognized as flattish pieces of clay traversed by cylindrical holes from which the original reeds have decayed. Fire preserves wooden beams by reducing them to charcoal, and any piece of charcoal of considerable size should be excavated carefully. Later study of charcoal from a wooden beam can provide information as to the age of the wood through Carbon-14 analysis or dendrochronology, as well as information on the species of tree which produced the wood.

*Robbed Walls and Foundation Trenches* - Later builders often removed the stones of earlier walls for use in their own constructions. Where this has occurred, the robbed portion of the wall, sometimes an entire wall or building, is represented only by a trench or trenches filled with relatively loosely packed earth. Indications of such robbed walls, sometimes called "ghost walls," may allow the ground plan of an entire building to be reconstructed even when the walls have been totally removed. During excavation, a robbed wall should be treated like a pit and cleared completely before the levels through which it penetrated are removed. The contents of the trench of a robbed wall must be later than the destruction of the original building, but how much later can only be determined by analysis of the chronological indicators, such as pottery, which the trench contains.

The footing of a wall or installation is normally set in a trench, called the "foundation trench," dug by its builders into earlier levels. Whenever a wall is under excavation the supervisor should attempt to identify its foundation trench. The contents of the trench are then completely removed, first along its face and, after the wall is dismantled, beneath it. This will leave the original foundation trench just as it was dug by the builders. Only when this is done should the levels through which the foundation trench was cut be excavated. The distinction between the foundation trench and the contiguous levels is important. The remains in each are from different phases and may even come from different strata or periods. The latest pottery from the foundation trench provides a *terminus post quem* for the building of the wall, since the latest sherds found in the trench were probably those of the builders. The pottery in the contiguous levels dates to earlier phases. Therefore, contamination of the material from contiguous levels with that from the foundation trench results in the loss of valuable evidence for dating.

*Dating of Structures* - When one is concerned with structures, there are two important dates: first, when the structure was built, and second, when it was abandoned or destroyed. The task of determining the chronology of a building is not always as easy as would at first appear. Pottery in the fill layers is of little chronological value, because the earth used in the fill may have been dug up from anywhere on or around the site. For example, fill put in over a Late Bronze Age house may have come from an area near the site where the occupation was predominantly from the Early Bronze Age and hence may contain almost exclusively Early Bronze Age sherds and artifacts.

Pottery that provides the best dating evidence comes from the sealed loci directly and functionally related to the structure. For the date of construction of a structure, the best material comes from the foundation trenches associated with it. Here, the latest sherds are probably those of the builders and they provide a date, the *terminus post quem* for the structure, that is the earliest date that the structure could have been built. This result may be checked against the latest sherds in the make-up layer directly under the floor.

Pottery from layers between successive floors of the same building provides useful dating indices, if the accumulation is the result of human occupation and not simply fill that was brought in from elsewhere. These sherds provide good sealed evidence for the end of occupation on the lower floor and the beginning of occupation on the upper floor. The final phase of the building may be dated from the pottery lying directly on or immediately above the latest floor. Caution must be exercised here, since in many cases later fill so directly overlies the last floor that accurate dating of the terminal floor is impossible. If the building was destroyed and the floor covered by destruction debris, however, the latest sherds would provide evidence for the date of destruction.

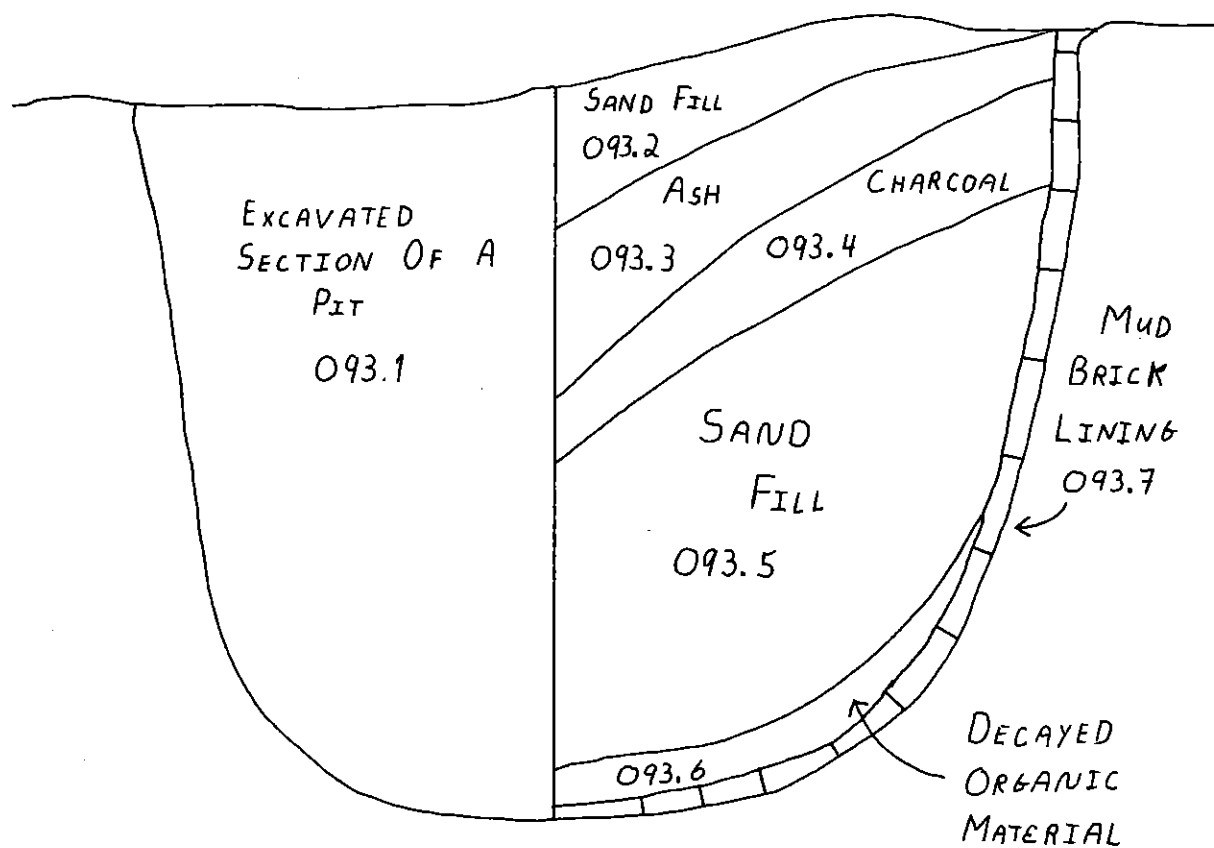


Pottery is not the only type of evidence that can be used for dating. Any artifactual material found in the aforementioned locations is valid for dating purposes. The discussion used pottery as the example because, at most Near Eastern sites, pottery is the dominant find of the excavation. It must be stressed that any and all evidence should be used in the dating process.

*Pits, Wells, and Pit Burials* - Pits, wells, and pit burials are examples of holes that ancient people have dug into earlier material for their own use. As such, they must be cleared to their bottom before the earlier material contiguous to them is excavated. Pits were usually dug for the storage of materials such as grain, fuel, or water, or for the disposal of refuse. They have a life of their own, therefore, and the contents of a pit are rarely contemporary with its use. When a pit is encountered it receives a locus number. It is then sectioned so that the component layers may be seen in relation to one another. The section is usually produced by dividing the pit in half along a diameter and excavating one half from top to bottom as a sub-locus of the pit. Thus half the pit is treated as a probe. Once the component layers of the pit fill have been identified in the section, they are removed in the other half of the pit from top to bottom. This work is guided by the layers revealed in the section. In recording the excavation of a pit, the pit itself receives the main locus number (093 in fig. 6). The half of the pit used as a probe to establish the layering within the pit receives the first sub-locus number (093.1 in fig. 6). When the excavation of the second half of the pit is begun, the top fill layer receives the next sub-locus number (093.2 in fig. 6). The sub-locus numbers are then assigned consecutively until the bottom fill layer (093.6 in fig. 6) is reached. Finally, the pit lining (093.7 in fig. 6) is excavated. The result is that all the component parts of Pit 093 and its fill layers are recorded separately, but all under the designation 093 and all on sheets consecutive with the 093 locus sheet. An abandoned and filled well is treated in the same fashion as a pit.

Pit burials are excavated and recorded in a similar way, although it is not always possible to section a burial pit. The sub-loci of a pit burial usually include the shaft, the capping material, the lining, and the actual burial remains. Human and animal bone provides valuable archaeological evidence and must be treated with special care. From the point of view of the area supervisor, the bones are simply another artifact of the area and should be excavated with proper safeguards. Information derived from the excavation of the grave and information obtained from a study of the skeletal remains will be recorded with the locus sheet (see pp. 48, 55-59). The assistance of a specialist is required to provide some of the necessary information. When the time comes for a skeleton to be lifted, usually after photography, the supervisor will call on the services of the osteologist or an appointed aid to assist in this operation.

*Sieving Techniques* - Archaeology is a science of retrieval of information from the earth. During the excavation of a soil layer potsherds, flints, coins, charcoal grains, slag, and many other remains



PIT - Locus 093

Fig. 6. Cross-section of a pit, showing its component sub-loci

relating to human occupation will be encountered. It is physically impossible for an excavator to see and retrieve all of these remains. To deal with this problem, various sieving processes have been devised. The two most useful processes, for the archaeologist, are dry and wet sieving.

Dry sieving or sifting is the simpler and less precise method. A wire mesh is attached to the base of a container and the container is shaken after earth is placed on the mesh. All material going through the mesh is discarded, while all residual material is closely examined for any artifacts before it too is discarded. The mesh size can be adjusted for the type of earth being sifted and the artifacts expected to be present. A normal mesh size for Near Eastern sites is 0.8 cm., although this may allow tiny chips from the working of flint tools, for example, to escape. Material recovered from the dry sieves is returned to the area where it enters the normal recording process (see Ch. 7).

The more refined and time-consuming method is wet sieving, or flotation. Earth is placed in a container with a mesh bottom which is then immersed in water. As the container is slowly agitated, three actions occur: clays, sands, and silts drop through the mesh, organic material floats to the top, and the residual coarse material is trapped above the mesh. The clays, sands, and silts are discarded. The organic material (the F fraction), consisting of grain, charcoal, and seeds, should be examined and reported on by the botanist (see p. 116). The residual coarse material (the G fraction) should be examined for artifacts and then sent to the geologist for closer examination (see 115). The mesh size may be altered to meet needs and conditions, but a common size for Near Eastern sites is 0.16 cm.

The decision regarding which technique to use, and when, depends on the conditions. Any soil layer will contain some archaeological information. Flotation is most useful when the recoverable botanical and geologic remains can be related to features. Pits, floors, and plastered surfaces provide sources where flotation would be most desirable. Sifting is sufficient where the value of the botanical and geologic remains would be limited, but where artifacts may occur nonetheless, such as soil layers between floors or fill. Occasionally massive earth fills or expanses of barren mud brick in a major wall will offer little hope of gaining significant information by sieving, and so simple dumping may be best. The balance between the amount of data that can be recovered and the amount of time and effort involved determines the type of sieving to be employed.

*Balks* - Previously, balks have been introduced and discussed in various contexts. Since balks contain much of the vertical control for the recording process, the area supervisor must give careful and continuous attention to them. To provide this vertical control effectively, balks must be cut vertically. A rough vertical cut is not sufficient. A plumb line and a carpenter's level, rather than simple eyeing of the cut, should be used to ensure a perfectly straight face on the balk. Volunteers may have the tendency to undercut the balks they

dig. They should be trained to leave about five centimeters of earth projecting from the balks during the digging process. In a separate operation, a technical man or an experienced and well-trained volunteer should trim the balk back to vertical. This trimming process should be kept up to date, since an untrimmed balk cannot be studied.

Since the balks contain the area's vertical history, nothing should be pulled out or removed from the balk, lest the record be distorted. Only when there is danger of balk damage or to preserve a very fragile artifact, and then only in consultation with the senior archaeologist and the field supervisor, should exceptions be made. For optimum use of the balk, every identifiable layer must be marked with a tag bearing the locus number and a brief description of the locus as it was excavated in the area. The number on the tag should be large enough to be legible in a balk photograph. The 10-cm by 5-cm tags are attached to the balk by means of nails so that the top of the tag is at the top of the associated layer. Tags for each layer should be affixed as soon after excavation as possible, for layers which are clear when the balk is fresh become indistinct and difficult to recognize when it dries out. After excavation of a locus, it is a good idea to drive a few nails into the balk along the bottom of the layer to help mark the distinction for later tagging. In fig. 7, a tagged balk is shown, and a sample tag is reproduced.

Much of the area supervisor's time is spent in the study of balks. For this study an inquisitive and critical mood is essential. During the study, which goes on informally all the time, each supervisor argues with himself or herself and discusses with volunteers and fellow supervisors what the layers in the balk mean, how they came to be laid down, and what the relationship is between each locus and those that surround it. One of the main functions of the senior archaeologist on his or her daily rounds is to initiate or join in such discussions and assist in the interpreting process. The interpretations worked out jointly by several critical and imaginative observers are more likely to be correct than the judgments of one supervisor.

Balks contain stratigraphic connections between areas. Also, as the excavation progresses, they tend to get dangerously high. For these reasons, interior balks must be excavated and removed. This will occur only after the balk has been drawn and photographed, and then only in consultation with the field supervisor. When a phase has been exposed across a field and the balks have been trimmed, studied, drawn (see pp. 28-33), and photographed, the balks may be removed. Since the balks contain the stratigraphic connections between areas, they should be excavated stratigraphically and fully recorded. In the balk-removal process, an area team is generally responsible for the excavation of the north and east balks of the area. After balk removal, complete phase photographs and drawings will probably be made. Then the balks will be reinstituted in the same places, and the excavation will start again on the next level. Reinstitution of the same balk pattern allows a continuous record to be produced in one section, from the top to the bottom of the site. Circumstances may justify deviation from this practice, but this decision rests with the senior archaeologist.

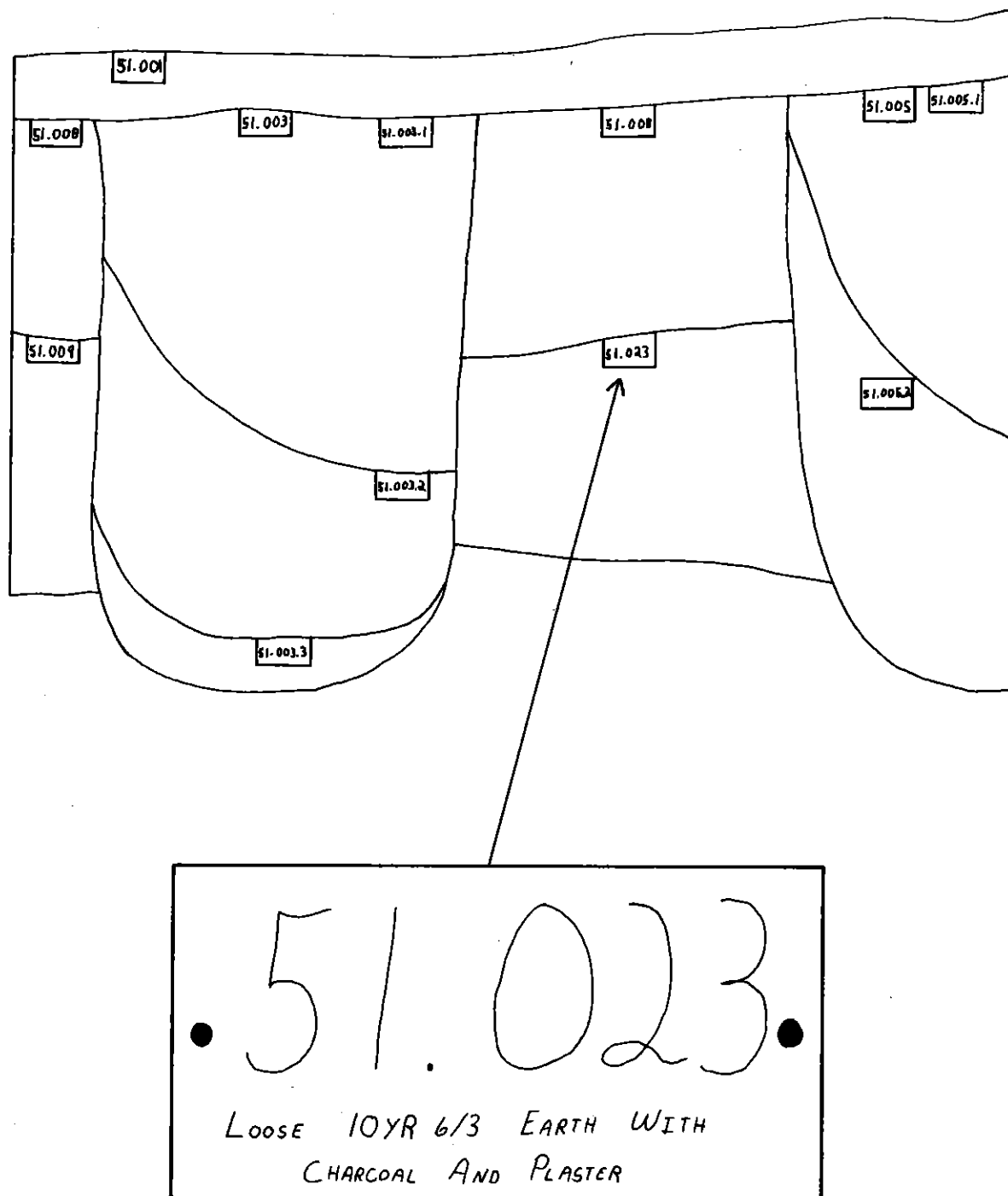


Fig. 7. A tagged balk and a sample balk tag (drawn to actual size)

### CHAPTER THREE: RECORDING TECHNIQUES IN EXCAVATION

In the course of a single day, all members of the field supervisory staff are required to do many tasks. Three of the most common and most important are drawing and reading sections, drawing and reading top plans, and recording information on and retrieving information from locus sheets. Each of these will be examined in detail.

#### *Sections*

As stated before (p. 7), a section is a scale drawing of one of an area's balks. Section drawing is a process that goes on throughout the digging season, and the area supervisor should keep the field supervisor continuously informed as to its progress. To avoid a great rush of work at the end of the season and in the interest of accuracy, the drawing of an area's four balks should be kept up to date.

On days when section drawing will occur, the area supervisor should check his or her equipment to make sure that all necessary tools for drawing are present in the field. The essential drawing tools are a line level, a length of good quality string or cord, four large spikes, a 10.00-m cloth tape, a 2.00 or 3.00-m white-faced or yellow-faced steel tape, a plumb bob with an attached string, at least two clothespins, graph paper, lined paper, a mechanical pencil with 4H lead, a pencil sharpener, a ruler, and an eraser. An aluminum clipboard makes a convenient drawing surface. If a section is being added to, rather than being started, the section that is to be continued and the accompanying descriptions of the loci should also be in the field.

*Preparation of the Balk for Drawing* - After the balk has been trimmed to vertical, the surveyor and the area supervisor should consult to establish the location of the datum line. They should examine the balk and locate a convenient place where a cord can be stretched horizontally without encountering protruding stones or other obstacles. Once this place is determined on the balk face, a spike should be firmly driven into the balk at one end of the section. With the transit the surveyor will determine the elevation of that spike and will assist the area supervisor in firmly placing a second spike, at the same elevation, at the opposite end of the section. The area supervisor should record the elevation of the two spikes, since they define the datum line. A length of cord is run between the spikes and attached to them at a distance of about 5 cm from the balk face, providing a horizontal line stretched taut across the face of the balk. Great care must be exercised in this leveling process, and a line level should be used to ensure that the cord is perfectly horizontal.

The area supervisor may sometimes be required to prepare a balk for drawing without the presence and assistance of the surveyor/architect. In this case the supervisor decides the most convenient location for the datum line, drives a spike firmly into the balk at one end of the proposed datum line, and attaches the cord to the spike. Hooking the line level onto the cord, the supervisor then goes to the opposite end

of the balk, fastens the cord to the second spike with a clove hitch, and, holding the cord taught, raises or lowers it until the line level shows that it is horizontal. The second spike is then driven into the balk, and a final check and appropriate adjustments are made to assure that the cord is in fact stretched horizontally along the balk face. Before the datum line is removed from the balk, the area supervisor should have its elevation taken by the surveyor/architect and should record the measurement on the section drawing.

To facilitate drawing, the datum line must be equipped with a horizontal scale. This can be simply done by attaching the cloth tape to one of the spikes with one of the clothespins. The tape should be adjusted so that the zero point on the tape is located exactly at the spike. The tape is then stretched out parallel to the cord and attached to the other spike using the other clothespin. The tape need not be drawn taut, since a slight sag will not materially affect the accuracy of the measurements. When the balks are very crumbly, it may be necessary to use separate spikes for attaching the tape to the balk. The tape provides a metric scale for the datum line. When a previous section is continued, successive datum lines should be less than 1.50 m apart. A greater separation between parallel datum lines would increase the chance of horizontal error. If a large balk is being drawn, therefore, two, three, or four datum lines may be required.

*Preparing to Draw* - Fig. 8 shows a balk that is both properly drawn and properly labeled. This figure should be referred to throughout the discussion of balk drawing. In the recording of balks, an unlabeled or improperly labeled drawing is of little value. At the top of any section drawing the following entries should be present: site, season, field, area, balk identification, scale, and the initials of the draftsman.

At the usual scale of 1:25, the section drawing of each 5.00-m area will be 0.20 m long on its sheet of graph paper. Two vertical lines should be drawn to represent the sides of the section. In fig. 8, which is a normal-sized section, these lines are 0.20 m apart. Next the draftsman should locate the datum line on the graph paper. Note that the graph paper consists of one millimeter squares and that the large squares consist of ten small squares grouped together. At 1:25, these larger squares represent 0.25 meters, and for convenience the draftsman should locate the datum line so that new meters begin with every fourth large square. In fig. 8, four datum lines are shown, 142.90, 142.05, 141.475, and 140.975, and they are positioned on the graph paper so that 143.00, 142.00, and 141.00 each comes on a large square.

If a section is being continued from a new datum line, a slightly different procedure must be followed. In labeling, only the new season, new datum lines, and the draftsman's initials need be added. The cloth tape must be in the same position in the horizontal plane as when the section was last drawn, that is, the zero point on the cloth tape must be directly below the point where it was located the last time the

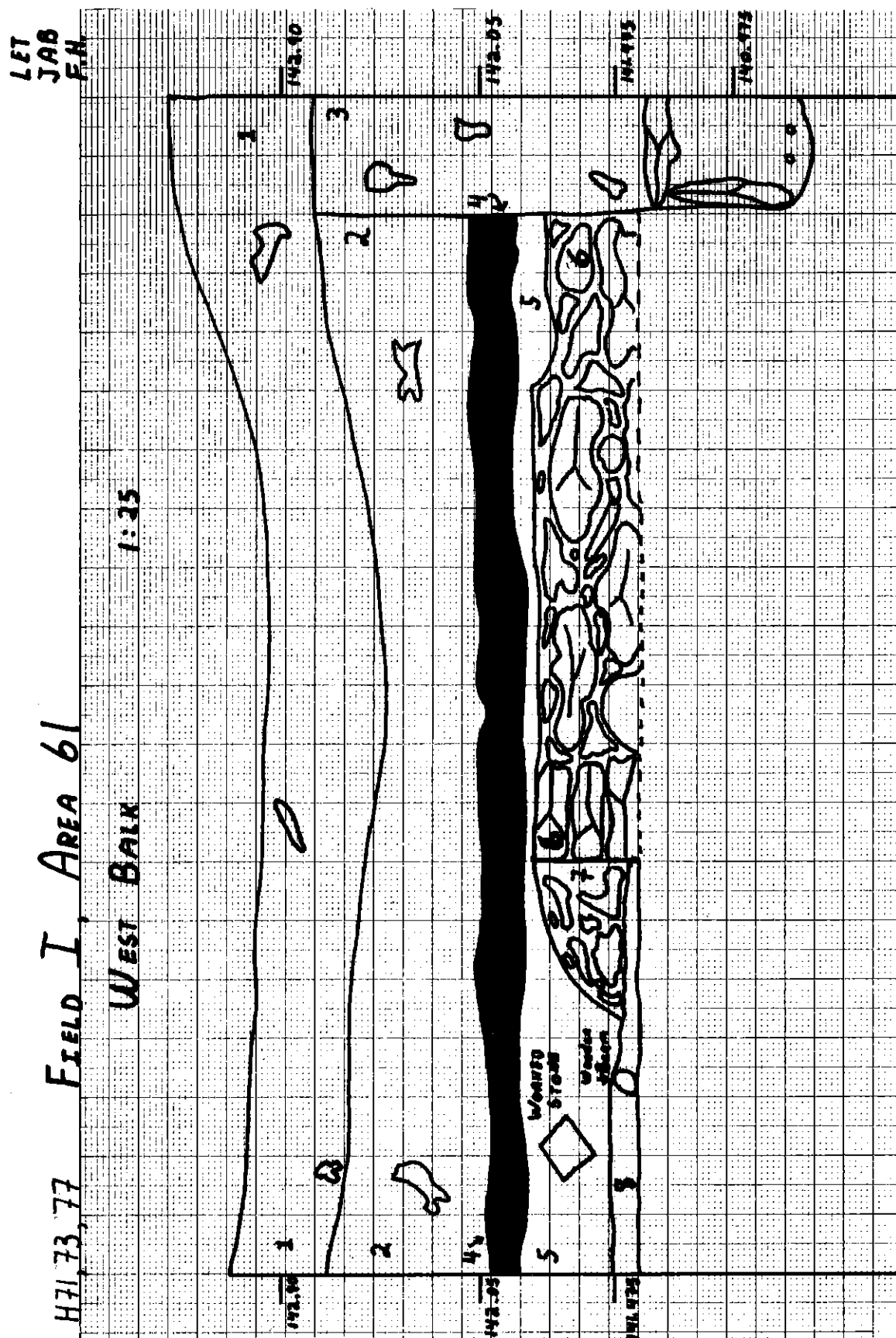


Fig. 8 (A). A working section from an area and its key



H71,73,77

LET  
JAB  
FH

## FIELD I, AREA 61 - WEST BALK

NUMBER	DESCRIPTION	LOCUS
1	LOOSE PACKED EARTH - 10YR 6/3 PLOW MARKS	.002
2	LOESS LAYER - HARD PACKED 10YR 7/4	.006
3	BURIAL	.007
4	ASH LAYER - BLACK	.015
5	UNSORTED FILL - 10YR 6/3	.019
6	MORTAR AND STONE WALL CHERT AND LIMESTONE	.018
7	TUMBLED AND UNSORTED STONES 5YR 6/1	.023
8	DARK HUMUS SOIL WITH ASH OVERLAYING LIVING SURFACE	.031

Fig. 8 (B). A working section from an area and its key

section was drawn. The draftsman must, therefore, check its location by taking several trial measurements, and then make whatever adjustments are necessary. The same trial measurements will allow a check on the position of the datum line. It should be possible from the new datum line to draw the bottom two levels of the last section precisely as they appear on the section drawing. If this cannot be done, and if slight adjustment of the datum line does not correct the problem, the field supervisor should be notified.

*Taking Measurements* - Measurements should be made systematically, following one level at a time. To take the simplest case, let us suppose that the first layer to be drawn is the undisturbed surface layer. The person taking the measurements will begin at zero on the cloth tape and will measure vertically from the datum line to the surface using the white-faced or yellow-faced tape. If the observer holds this tape loosely between thumb and forefinger, the metal case will act as a plumb bob, and measurements will be vertical within the limits of accuracy for the section. This process is repeated at 0.25 m intervals along the cloth tape, with the measurements being called to the draftsman. A convenient form in which to relay observations is, "At 0.25 m (i.e. along the cloth tape), up 0.22 m (i.e. above the datum line)." When the end of the cloth tape is reached, the observer moves to the bottom of the surface layer, and measures its position in the same way, always working from the datum line and not directly measuring the thickness of the layer. Having measured the surface layer, the observer then moves to the layer below and takes observations on it in the same manner, proceeding thus systematically until the bottom of the section is reached. At some point the datum line will be crossed, and the subsequent vertical measurements will, of course, be below the datum line ("down x m").

Not all levels are as easy to measure as a nearly horizontal soil layer. The major problems are posed by large stones, artifacts, installations, and bones which may appear in the balk and must be drawn, and by sudden breaks or changes in the contour of a layer. The only general rules to remember are that measurements are to be taken systematically around a level, that the 0.25-m intervals along the cloth tape are not sacrosanct but must be modified to fit the changes in the layer, and that any measurements dictated by common sense are justified.

*Plotting the Measurements* - Working from the datum line on the graph paper, the draftsman plots each measurement as it is called out by putting a small light dot at the proper place on the section. The draftsman should not allow unjoined dots to accumulate on the paper for this invites confusion and delay. The pace of the work is set by the draftsman who should not allow the observer to rush him or her into inaccurate plotting. This can only lead to a waste of time when observations must be repeated. As soon as the outline of a level is completed, it should be marked with a labeling number. This number will subsequently be used in compiling the key to the section (see below, p. 33). For each new section "1" will be the initial number. When a section is being continued, the labeling numbers are also continued

sequentially. All pencil work should be done lightly with the point of the pencil lead; since hard lines are impossible to erase cleanly. No shading or symbols should be placed on the section drawing, except for the label numbers and the designation of ash layers. Once the edges of a black ash layer are defined, the ash layer should be shaded to black with the edge of the pencil. When excavation has ceased and the bottom of a locus has not been reached, a broken line is used to indicate the temporary stopping point.

*Subsidiary Sections* - The subsidiary balks which are created to connect isolated features with the main balks should always be drawn, and the technique for this is the same as that described above. Since these balks are usually small in size, it may occasionally be necessary to use the scale of 1:10 instead of the normal 1:25. If at all practicable, however, the 1:25 scale should be used.

*Finishing a Section* - When it comes from the field, the section is a series of lines indicating the demarcation between loci which are identified by a consecutive series of numbers. These numbers (see below) should be noted on the locus sheets which describe the loci. The section itself is much more useful if it also indicates the nature and composition of the loci. This could be done by printing all relevant information on the section, but the graphic effect of the drawing would be ruined by the confusion of words written on it. Most of this confusion can be eliminated if the consecutive numbers are identified in a key accompanying the section (see fig. 8:B). A section prepared in this way is clearly identified by its heading, shows the outlines of the levels, indicates their respective locus numbers, and contains a brief description of each level.

Fig. 9 is a final section for two contiguous areas from the Hesi excavations, reduced to 1:50 for publication, together with its key. It shows the complicated stratigraphy that can be reported in a section.

#### *Top Plans*

Top plans are drawn and kept by the area supervisor to preserve in a graphic form the day-to-day progress of excavation. The top plan is partially a scale drawing and partially a sketch that shows the physical plan of the area's surface. Top plans should be drawn daily and are usually prepared as the last task at the close of a day's work in the field. This allows the supervisor to start the next day with a neat and properly labeled top plan. It is also possible to start a day by drawing the top plans, but this tends to leave some people idle at the beginning of the work day.

The tools necessary to draw a top plan are similar to those that are needed to draw a section. They are a water level or a line level and a 9.00-m piece of string, two large spikes, ten nails, two 10.00-m cloth or metal tapes, a 2.00-m or 3.00-m white-faced or yellow-faced steel tape, two plumb bobs with strings attached, graph paper, a mechanical

TELL EL-HESI  
FIELD 1 AREAS 1-2 SOUTH BALK

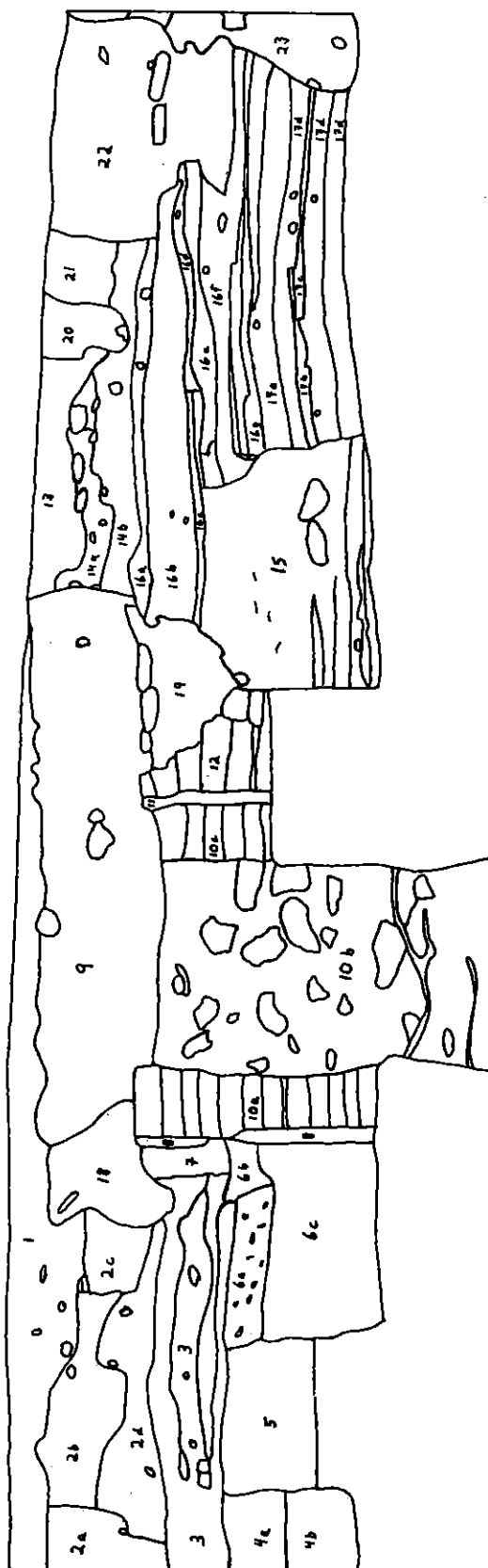


Fig. 9 (A). A final section from Tell el-Hesi and its key

## Field I Areas 1-2 South Balk --- Key 1:50

1. Top soil
2. Large layers of loose compact soil
  - a. 1.030 - loose soil
  - b. 1.005 - compact detritus
  - c. 1.033 - compact detritus
  - d. 1.053 upper - loose soil metaled surface
3. Compact soil layers
  - a. 1.053 - some cobblestones
  - b. combination of 1.074 and 1.076 - compact, some cobblestones
  - c. 1.074
  - d. 1.076
  - e. 1.095 - mud brick
  - f. 1.096
  - g. 1.099
  - h. 1.101
  - i. 1.106
  - j. 1.115
4. Soft earth layers
  - a. 1.147
  - b. 1.187
5. Mud-brick wall - 1.200
6. Soft earth layers
  - a. 1.141
  - b. 1.117
  - c. 1.186
7. Mud-brick wall - 1.077
8. Loose soil, foundation trench - 1.103
9. Loose soil - 1.019
10. Building - 1.126
  - a. Mud-brick wall - 1.051
  - b. Loose earth and broken bricks, fill - 1.105
  - c. Mud-brick wall - 1.073
11. Loose soil - foundation trench - no number
12. Mud-brick wall - 2.054
13. Compact detritus - 2.022
14. Loose soil layers
  - a. no locus number
  - b. 2.071
15. Loose soil debris, ash - pit 2.037
16. Compact soil layers
  - a. 2.076
  - b. no locus number
  - c. 2.045
  - d. 2.042
  - e. 2.057
  - f. 2.070
  - g. Series of lenses - 2.016
17. Loose soil mixed with ash lenses

Fig. 9 (B). A final section from Tell el-Hesi and its key

pencil with 4H lead, a pencil sharpener, a ruler, an eraser, a drawing compass, and a clip board.

To draw a top plan, the area supervisor must again utilize the services of the surveyor. The surveyor is needed to set up four permanent points before the start of excavation and to provide, on a weekly basis, a few key elevation points. The permanent points are the four corner grid points of the area. They are 6.00 meters apart and are to be found in the center of the balks at the corners. In fig. 10, points A, B, C, and D are the corner grid points. The elevation points, or datum stakes, are usually placed on the balk face or on a prominent and stable feature on the floor of the area. The surveyor determines the elevation of these datum points to within a centimeter, and they are used by the area supervisor to calculate other elevations in the area.

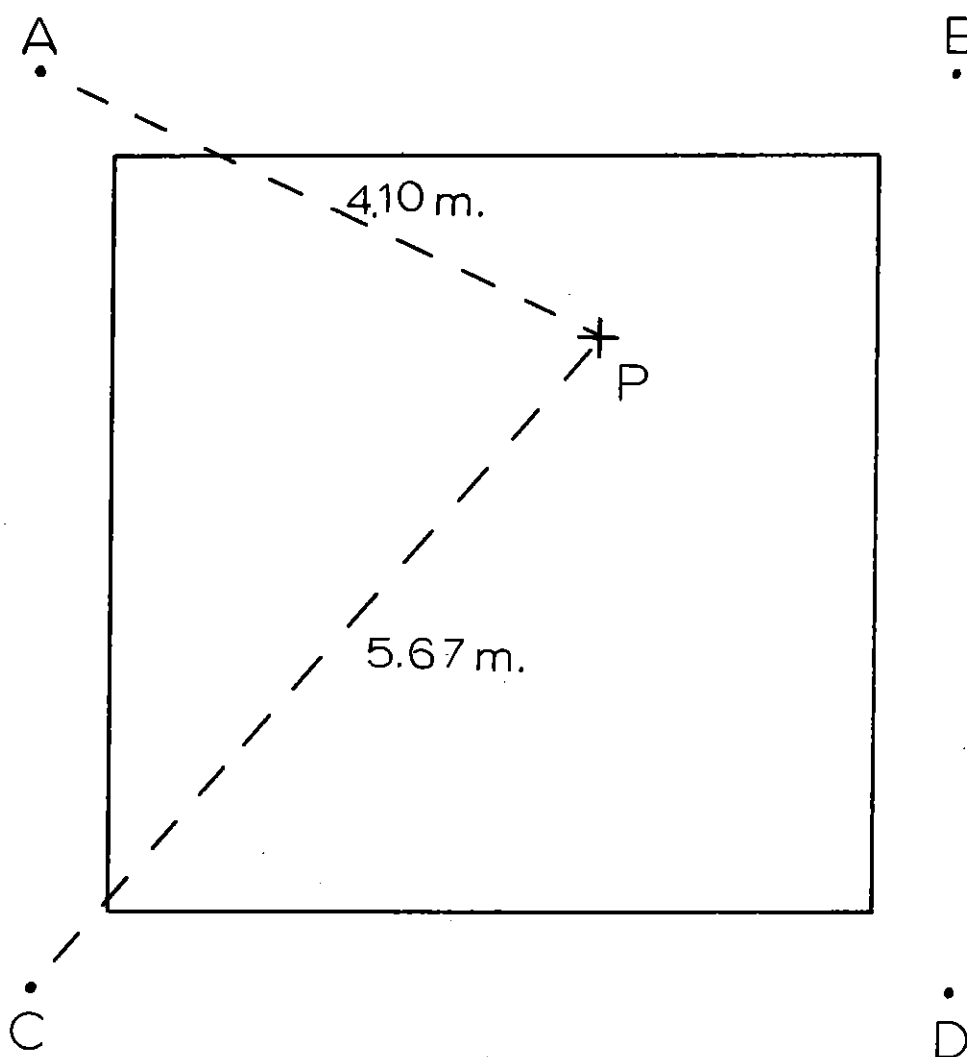


Fig. 10. Simple triangulation from known points to an unknown point

*Triangulation* - Triangulation is a surveying technique designed to locate unknown points, given at least two known points. In fig. 10, the location of point P is desired, while points A, B, C, and D, the cornerpoints of the area, are known. Triangulation works best if the angle created by the lines joining known points with the unknown point at the vertex is between 50 and 130 degrees, and preferably as close to 90 degrees as possible. Therefore, points A and C are chosen to locate point P. The distances A to P and C to P are measured, keeping the tape horizontal at all times. The draftsman reduces each measurement to the scale used in the top plan (1:25) and describes an arc of the proper radius from each of the known points. The point of intersection of the arcs is the location of the unknown point P. Through this method any number of desired points can be located with a high degree of accuracy.

Since the amount of measuring and plotting necessary makes triangulation rather time-consuming, a simplified adaptation is often preferable. Assume that a long and regular feature is to be drawn. Fig. 11 depicts a mud-brick wall, two bricks in width, with very regular features. The draftsman sets points A and B by driving small nails into the earth and determines their position by triangulation.

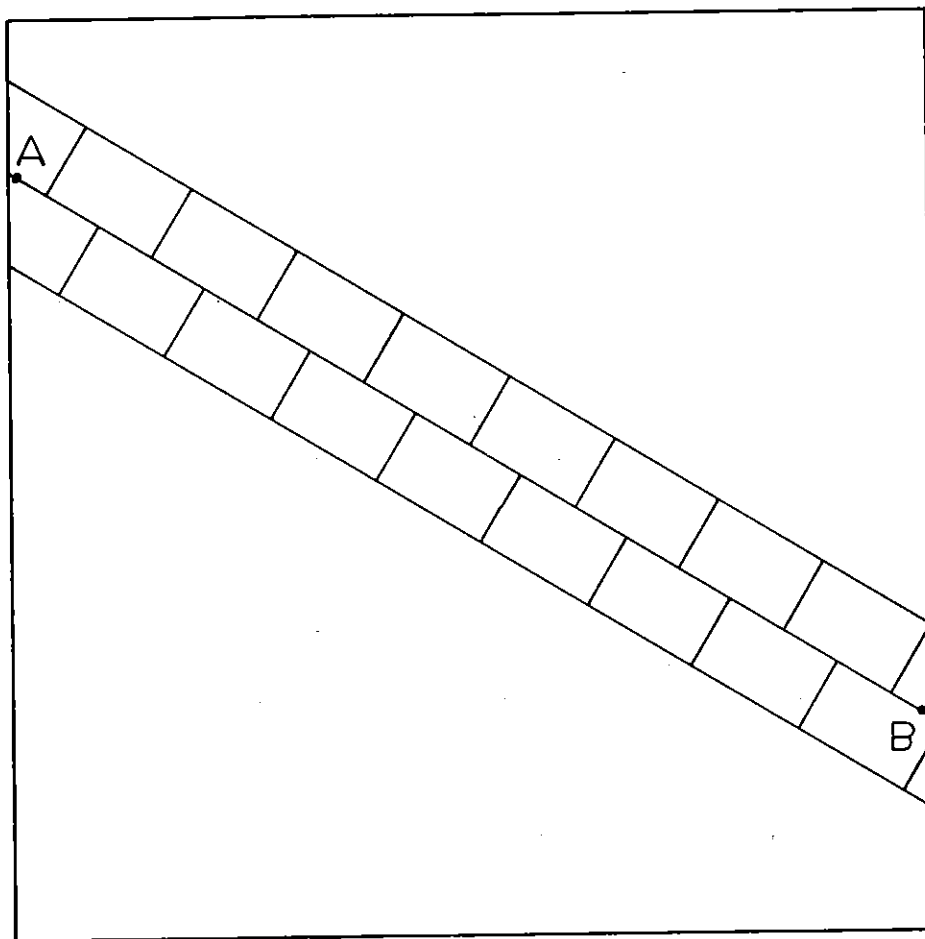


Fig. 11. Triangulation points for the drawing of a regular feature

If a cloth tape is then run between points A and B, all the bricks and features of the wall can be measured by using the cloth tape as a scale and taking measurements from it with a small steel hand tape. The draftsman locates points A and B on graph paper and runs a light line between them. This line then represents the cloth tape and serves as the axis for all measurements needed in the drawing of the mud-brick wall. This method can be adapted for the rapid and accurate drawing of most features uncovered in an area.

*Drawing a Top Plan* - Top plans should be headed with site, season, field, area, scale, date, north arrow, and the draftsman's initials. Fig. 12 is a properly labeled and drawn top plan that will serve as a basis for the present discussion. The scale of 1:25 is used for top plans, as it was for sections. This scale is small, but adequate to record the features of an area.

First, a rectangle is drawn on graph paper to represent the sides of the area, in this case 0.20 m x 0.20 m, representing a 5.00-m-square area. The drawing is made so that north is toward the top of the page. For ease in comparison, the same orientation should be kept for all subsequent top plans. Within the rectangle the draftsman makes scale drawings of the major features on the area's surface. It is best to begin drawing by starting with central or conspicuous features that can serve as reference points for the drawing of other features. Triangulation is used to locate these features. For example, in fig. 12 five or six points would define the squarish mortar and stone structure and two would define the mud-brick wall. Once these two main features are located and drawn, all other features can be drawn according to their relation to the main features and the balks.

When a feature first clearly appears on a plan, it should be drawn with as much detail as scale allows. For example, a wall will be drawn stone-for-stone or brick-for-brick, and the individual cobbles in a cobbled roadway will be accurately shown. Such careful drawing is necessary only once for each feature. On later top plans the feature will appear in outline form only, with roughly parallel lines representing the faces of a wall or, in the case of other features, with the perimeter sketched in. An example of this is the mortar and stone wall in fig. 12.

The top plan should include any feature large enough to appear on the relatively small scale of the drawing. The supervisor should make sure that the scale of small features is not exaggerated beyond their proper relative size to give them prominence in the plan. Also, it may not be clear initially whether a large stone has any relation to the surviving architecture of the area, or whether a line of rocks is the result of accidental fall or of design. For example, in fig. 12, the three rocks labeled 034 may represent the remnants of a fire pit. Such problematic features should always be drawn on the top plan.





*Labeling the Plan* - All that is strictly required on the top plan are the locus numbers and elevations of the various loci. Locus numbers are encased in boxes, while elevations are marked either by the symbol ⊗, or by the symbol x, and the elevation is placed next to the symbol. The elevation symbol selected is determined by the method employed to determine the elevation. Three methods may be used: transit leveling, line leveling, or water leveling. If the surveyor obtained the level using his transit and a meter stick, it is an official level and is marked by ⊗. Line leveling utilizes a string stretched horizontally from a known datum point, an ⊗ point, to an unknown point. A bubble level enables one to level the line, and then the vertical distance between the line and the unknown point is determined using a plumb line and a steel tape. This distance is subtracted from the datum elevation to arrive at the elevation for the unknown point. A water level is a length of flexible, transparent plastic tubing that contains water colored with a red or black dye. One end of the tubing is attached to a meter stick, on which a vertical scale in meters and centimeters has been painted with the zero mark at the bottom of the stick. The other end of the tube is left free. In use the free end of the tube is held in such a way that the water at this end is level with one of the datum points whose elevation has been determined by transit measurement. The measuring scale attached to the other end of the tubing is placed with the zero mark on the point of unknown elevation. The water in this end of the tube will then rise to the level of the datum point, and the difference in level between the datum point and the unknown point can be read directly from the scale. Elevations determined either by line leveling or by water leveling are marked by x. On fig. 12, the two transit levels on Walls 016, 017, and 018 are marked by ⊗. All other elevations were obtained by line or water leveling and are marked by x. Two words of warning must be given. When using a water level, bubbles must be kept from the tubing. When taking a line level, the bubble level should be located slightly off-center on the string or it may read level when the line is actually sagging appreciably, and a second reading should be taken with the ends of the level reversed to detect faulty readings of the bubble level.

*Other Symbols* - Positions where significant artifacts were uncovered during the day should be marked on the top plan, also with a small x, and a brief printed identification of the artifact should be placed on the plan. The symbol "R" is placed on the top plan to mean "removed" for a locus removed that day or the day before. When a reader is viewing a top plan, it is frequently important to know what locus directly overlay the locus currently exposed. This can be indicated by placing the number of the former locus above the present one, both in boxes, separating them with a line, and placing an "R" next to the former locus number (fig.12). The symbol "R" should also be used to mark areas where material is removed during the working day. In this case the excavated portion of the area is delineated by a broken line (-----), as opposed to a solid line, and an "R" is penciled inside the part removed. When an elevation is placed so that it could refer to either the top or the bottom level of a feature, a ↑ or a ↓ should be placed next to the elevation to indicate which is meant. The

symbol  $\angle_{C \#xxx}$  should be placed on the top plan to locate the spot and viewing direction for any photograph taken during the day. The  $\angle$  should give a rough estimate of the view of the picture, and the xxx should be replaced by the photograph number (fig. 12). When numerous or important pottery containers are being removed from a single locus during one day, the supervisor should write the pottery container number on the top plan to indicate in what part of the locus each pottery container came from.

*Subsidiary Top Plans* - An important feature, such as a burial or an industrial installation, may be too small to show in sufficient detail on the daily top plan. In such cases a subsidiary top plan is drawn to the scale of 1:10. The heading of the drawing and the techniques used in its presentation are the same as those employed with daily top plans, except that the heading includes an indication of the subject on the plan (e.g., "Field I, Area 61, Locus 034 - Firepit"). The outline of the area covered by the subsidiary top plan must be indicated on the daily top plan, so that its position in relation to the rest of the area will be clear.

*Additional Comments* - The foregoing description of an area supervisor's drawing responsibilities may sound like a full-time job in itself. The supervisor is not being asked to produce artistic masterpieces or finished drawings for final publication, however, but illustrations for the area notebook as part of the recording process. Once an area's top plan has been established, there are enough repetitions from day to day to simplify and speed up work appreciably. The drawing of the daily top plan can often be greatly accelerated by a little preparation in advance. Not only can the heading be placed on the sheet and the outline of the area drawn, but usually numerous features can be traced from the previous top plan to the new one without loss of accuracy. The preparation of the traced sections of the daily top plan should be done on a light table. With this kind of preparation, the new top plan can normally be completed in fifteen to thirty minutes.

The drawing of features in relation to one another is a valuable stimulus to the supervisor in the task of interpreting what has been uncovered.

#### *Locus Sheets and the Recording Process*

An efficient system of archaeological recording should have four characteristics.

- 1) It should be sufficiently simple to relieve the supervisor of constant worry about the system itself as he or she faces daily crises and unexpected finds.

- 2) Since the area supervisor is never sure what is being dealt with when a new locus is first uncovered, the recording system must allow for expansion of detail and interpretation as continued excavation clarifies the nature of the locus.

3) The method of recording should keep all the data belonging to each separate locus in one place. This is in contrast to the older diary system where data from one locus was spread over a large number of entries along with data from other loci.

4) Interpretive comments by the supervisor are an essential part of the recording process. Since the interpretive comments are by their nature subjective, they must be very carefully distinguished from raw data and the factual observations of the excavation.

For these reasons the field recording system developed for Tell el-Hesi centers around the locus sheet. Locus sheets for each area are kept together as a unit in the area notebook maintained by the area supervisor. Each separable soil layer, of whatever nature, is designated as a locus and is assigned a locus number. In each area the numbers are consecutively assigned to loci in the order in which the loci appear. Thus, in a newly opened area, the surface humus will be designated locus 001, the first probe or recognizable feature to appear will be designated locus 002, the next 003, and so on. All data relevant to a locus is recorded on the locus sheet which bears the number of that locus. No pagination is necessary for the area notebook, since it can be ordered by locus numbers. Occasionally a second page is required in the recording of a locus, and is designated "p. 2" after the locus number.

During the actual season of excavation, the locus sheets serve as the storehouse of information for the various loci and consequently should be the constant concern of the area supervisor. If the area supervisor misses some detail, and it is not recorded, then that detail will probably never be relocated and properly placed in the description of the locus. At the end of the actual excavation process, the area notebook is passed on to the field supervisor and the senior archaeologist. They share the task of reporting on the season and on the excavation as a whole. To do this, they utilize their own notes, the locus sheets, the top plans, and the sections in this analytical part of the excavation.

The locus sheet is a one-page printed form on which all relevant information gathered in the excavation of a particular locus can be recorded. After a heading, the sheet contains twelve informational parts (see fig. 13). The heading includes the site, season, field, area, locus, and area supervisor's initials. The twelve divisions of the locus sheet are:

- 1) Diary of Excavation
- 2) General Description
- 3) Location in Area
- 4) Extent
- 5) Section References
- 6) Top Plan References
- 7) Photo Numbers

Field\_\_\_\_ Area\_\_\_\_

H\_\_\_\_ Locus No.\_\_\_\_ Initial\_\_\_\_ Page 1

1. Diary of Excavation2. General Description (Attach any Coded Data)3. Location in Area  
General Data

Underlies

Overlies

Is contiguous with

4. Extent

Greatest length

Greatest width

Thickness

Other measurements

5. Section References6. Top Plan references7. Photo Numbers8. Levels  
Top

Bottom

Other

9. Number of Baskets of Soil from Locus

Fig. 13(A). Blank locus sheet (Obverse, reduced from 8½ x 11)

## 12. Interpretive Comments During Excavation

## Post-Dig and Phasing

Fig. 13(B). Blank locus sheet (Reverse, reduced from  $8\frac{1}{2} \times 11$ )

- 8) Levels
- 9) Number of Baskets of Soil from Locus
- 10) Pottery
- 11) MCR
- 12) Interpretive Comments

*Diary of Excavation* - This section of the locus sheet relates to the progress of excavation of the locus. It should tell when and under what conditions the locus first appeared, the strategy that was used in its clearance, how the excavation proceeded from day to day, and finally when and for what reason the locus was discontinued. This section should be in narrative form. References should be made to contiguous loci, and all entries should be dated.

*General Description* - The purpose of this section is to provide a systematic record of all relevant data concerning a locus that is observable to the eyes, exclusive of the data obtained from measurement. It is important that as much information as possible be included. Accordingly the area supervisor should be prepared to see and promptly record all significant features concerning the locus. For a soil layer, for example, such information should include color, particle size, compactness, degree of sorting, and the non-soil materials included in the layer.

Color is one of the most distinctive features of a soil layer. The best device to aid in the description of color is the *Munsell Soil Color Charts* (1954). These charts are a set of 196 standardized color chips that can be used as a scale to describe almost any soil encountered. Each color chip is identified by a number composed of three parts. The first describes the hue of the soil, i.e., the combination of yellow and red that it contains. Examples of hue descriptions are 10R, 2.5YR, 10YR, and 2.5Y. The second part indicates the value or lightness of the soil by a number between 0 and 10 that is followed by a slash (/). Finally, the chroma or strength of the soil color is represented by a number between 0 and 10 after the slash. A complete Munsell color-coded number would be 10YR6/3, 10R3/2, or 7.5YR6/4. A number such as 10YR6/3 represents a color that is precisely identifiable by anyone who has access to the *Munsell Soil Color Charts*. A subjective description, such as "pale brown" or "light yellowish brown," means something different to everyone who reads the description. For this reason, the soil color or colors of each locus should be coded to the Munsell scale. During color coding, it is best to use a consistent light source. A direct shadow in sunlight seems to produce very good results. If a prose description of the color is also required, the description given in the *Munsell Soil Color Charts* may be used, but always in conjunction with the Munsell number, thus 10YR6/3 (pale brown).

Another characteristic of soil is particle size. Between 1916 and 1922 the Wentworth - Udden scale (Wentworth 1922: 377-81) was developed as a means of describing particle size. There are seven main classes:

< 1/256 mm	-- Clay
1/256 mm - 1/16 mm	-- Silt
1/16 mm - 2 mm	-- Sand
2 mm - 4 mm	-- Gravel
4 mm - 64 mm	-- Pebble
64 mm - 256 mm	-- Cobble
> 256 mm	-- Boulder

In the General Description the various particle sizes present should be noted as well as their relative proportion. In this task the geologist can be of great assistance, but with a little practice the area supervisor should be able to distinguish the various classes. Finer distinctions, especially in the sand category, are useful. Notations of fine or coarse sand should be made whenever possible.

The other features of soil layers that should be noted are compactness, sorting, and the non-soil contents. Compactness is simply the hardness of the soil and can be described as very loose, hard-packed, cementlike, or crumbly. Sorting is the degree to which the variously sized particles, artifacts, and non-soil inclusions are separated within the soil layer. For example, distribution of the inclusions within a soil layer may be "random," "layered," or "poorly sorted." The non-soil contents can be crucial in the study of soil layers. The types and amounts of such artifacts as pottery, charcoal, plaster, or objects should be noted.

The principles to be followed in filling out the General Description for features other than soil layers are given below on pp. 67-71.

*Location in Area* - This information is provided by the top plans, but is also entered in the locus sheets for ready reference. Two types of information should be placed here. The first is the relative position of the locus. This includes a list of the loci that overlie, underlie, and are contiguous with the locus under study. The second is a physical description of the precise position of the locus in the area. This may include the center point, where the locus runs into balks, or where it meets other loci.

*Extent* - This entry contains the measurements of length, width, and thickness that help describe the volume and size of the locus. The nature of the measurements required varies with the different types of loci encountered, but should always be fully descriptive of the locus.

*Section and Top Plan References* - These entries refer to the drawings on which the locus appears. The section reference should include every section or subsidiary section in which the locus appears, and should give the layer number(s) on the section which represent the locus. The top plan reference should be to the one or two drawings in which the locus appears in the greatest detail.

*Photo Numbers* - If the locus was photographed, the date, time of day, and direction from which the photograph was taken should be



entered. The area supervisor should also obtain the photograph number from the photographer and record it with the rest of the information (see p. 67).

*Levels* - Levels for the top and bottom of each feature should be obtained and recorded. Measurements should be recorded in meters to two decimal places (e.g., 141.83 m). Those determined by the surveyor using a transit should be marked with an (X); those obtained with a line level or a water level (see p. 40) are not as accurate, but are recorded to the same precision. The datum point (X) from which such measurements are derived should also be noted. For extensive loci, several top and bottom levels are needed. Where appropriate, levels at protrusions or the find-spot of significant artifacts are recorded under "Other."

*Number of Baskets of Soil from Layer* - The total number of baskets of earth taken from a locus provides a rough estimate of the volume of soil removed from it. To increase the accuracy of the estimate, baskets should be filled to a uniform level and the basket count kept with care.

*Pottery* - This section of the locus sheet is divided into four columns with the following headings: "Pail Number," "Observations," "Field Call and Number of Registered Sherds," and "Registry Numbers." The first column lists the field number of all pottery containers used for the locus. The second column contains the area supervisor's judgments about the representativeness of the pottery and his or her comments on whether it is contaminated by pottery from other loci. Any other pertinent observations concerning the pottery, as it is seen in the field, also belong here. The third column is filled in during the field pottery-reading session (see pp. 91-93). The field call and the number of registered sherds are entered here. An asterisk indicates the period whose pottery is dominant. The fourth column includes the registry numbers assigned by the pottery registrar (see p. 93).

*MCR* - MCR refers to the Material Culture Registry (see pp. 95-108). All objects and materials modified by or owing their presence in the locus to human activity are entered in the MCR. The corresponding section of the locus sheet is divided into five columns: "MC Number," "Associated Pottery" number, "Analysis," "Specialist and Number," and "Registry Number." The MC number assigned in the area and more properly referred to as "the field MC number," is placed in the first column. The container number for associated pottery is placed in the second column. This is the number of the pottery container in which the MC item would have been placed had it been pottery. The third column describes briefly the results of analysis by the field laboratory. The fourth column identifies the specialist who studied the material and lists the specialist's number which indicates where the detailed analysis of the sample is to be found in the specialist's notebook. The last column contains the material culture number assigned to the sample by the material culture registrar.

*Interpretive Comments* - This is the entry toward which the recording process has been moving. Here, in dated entries, the area supervisor is

free to speculate about the locus, its function, and its age. Alternative explanations for the locus should be considered, and all that remain possible should be noted here. Four basic questions should be discussed.

- 1) What kind of human or natural activity produced this locus?
- 2) What is the relationship of this locus to other loci?
- 3) How did this locus function?
- 4) What information does this locus yield concerning the history of the site?

During the excavation process theories come and theories go, but ultimately a "final" judgement must be made concerning the phasing and function of each locus. This usually takes place during the research directed toward publication and is, therefore, entered under "Post-Dig and Phasing".

Figs. 14, 15, and 16 are examples of completed locus sheets. Locus 006 (fig. 14) is shown in section in fig. 8, while loci 017 and 040 (figs. 15-16) appear on the top plan in fig. 12. The three examples represent different types of loci: a soil layer, a wall, and a pit. A type not shown is a burial. Burials are recorded much like pits, except that they also provide grave and skeletal information that must be recorded. The complexities of recording burials have led to the creation of a burial code form. This form supplements the General Description and presents the observations on the grave and on the skeleton in numerical form.

#### *Burial Code Form*

The burial code form provides a simple, but comprehensive, storehouse for data concerning burials. Using this device various attributes relating to burials can easily be recorded. The burial code form, as presented here, was designed to record the various burial attributes of the Muslim cemetery found at Tell el-Hesi (stratum II). It may serve as a guide for the creation of other burial code forms, but annotation classes or specific categories would have to be adapted to the distinctive phenomena found in other cemeteries. Appendix 4 provides the rationale for the various entries in the burial code form used at Hesi.

The burial code form is divided into two parts, skeletal data and grave data. Skeletal data includes three labeling boxes and eleven annotation classes, while grave data includes three labeling boxes and nine annotation classes. Fig. 17 is a completed burial code form. After completion this form is attached to the locus sheet.

Field I Area 61H 77 Locus No. 006 Initial JAB Page 11. Diary of Excavation

- 20 June - Probe 001 was stopped when loess layer was encountered under the plow marks. Loess layer named 006.
- 24 July - Probed in NW corner through loess. It overlies an ash layer 015. Excavating out from probe.
- 25 July - No problems. N 1/2 of area completed - still coming down on ash 015.
- 26 July - 015 appears to cover area. 006 removed except in SE 1/4.
- 27 July - Completed excavation with no problems. 006 overlies 015 over entire area. No problems in distinction.

2. General Description (Attach any Coded Data)

Loess layer. Unsorted clay sized particles. Uniform color 10 YR 7/4. Very hard packed containing little other material - a few pot sherds and cobbles - both unsorted.

Plow marks evident on top of layer.

Layer rests on a black ash layer, as a consequence the bottom of this layer is slightly discolored.

3. Location in Area

General Data Covers entire area, except where cut through by burials.

Underlies 002

Overlies 015

Is contiguous with Covers Area, cut by 007, 008, 011, 020

4. Extent

Greatest length 5.00 m

Greatest width 5.00 m

Thickness 39 cm SE  
73 cm NW

Other measurements Ave. Thickness  
~ 48 cm

5. Section References

All balks  
Sub. Section 21/7/73

6. Top Plan references

24 July, 1973

7. Photo Numbers

None

8. Levels

	NW	SW	SE	NE
Top	142.76	142.70	142.62	142.59
Bottom	142.10	142.05	142.24	142.19

Other

9. Number of Baskets of Soil from Locus

38 + 97 + 101 + 96 + 15 = (347)

Fig. 14(A). Completed locus sheet for a soil layer (Obverse, reduced from 8 1/2 x 11)



Field I Area 61H 77 Locus No. 017 Initial F.H. Page 11. Diary of Excavation

14 JUNE - ENCOUNTERED IN THE EXCAVATION OF 015. Seen near the center of the Area. Named 017. See ALSO 014, 016

26 JUNE - RE-ENCOUNTERED IN THE EXCAVATION OF 019. WALL LINE N-S.

2. General Description (Attach any Coded Data)

MORTAR AND STONE WALL - BOULDER, COBBLE, AND PEBBLE WALL  
CEMENTED TOGETHER WITH A LIMB MORTAR WITH A DARN COLOR 2.5YR 6/4  
SOLID STONEMWORK WITH AN ATTEMPT TO GET FLAT STONES ON  
the OUTSIDE. UNWORKED STONES LAID WITH NO REAL COURSES  
STONE PORTION IS PRIMARILY CHERT COBBLES + PEBBLES MIXED WITH  
LARGE IRREGULAR LIMESTONE BOULDERS  
ALL STONES ARE SIMILAR TO THOSE FOUND IN the Wadi Hase  
WITH 018, 016a threshold is FORMED IN SOUTH - Note Sockat - 78 cm  
WIDE THRESHOLD.

3. Location in AreaGeneral Data

THREE WALLS OF A RECTANGULAR BUILDING  
HEIS N. Wall 1.78 m from east wall  
East 3.65 m S and turns west

Underlies 015, 019

Overlies

Is contiguous with 007, 023, 037, 036, 042, 043, 033, 035, 014, 016

4. Extent

Greatest length 3.70 m N-S Greatest width 205 m E-W

Thickness

Other measurements

Width ~ 42.5 cm

5. Section References

NORTH BALK

Sub. 20 JUNE, 1977

6. Top Plan references

28 June, 1977

7. Photo Numbers


1 July - 11am, From S. #423

8. Levels

Top 142.03 @ South

141.91 @ East

141.84 NORTH

Bottom Floor level - 141.38 - 141.42; base of wall unexcavated in 1977, as seen in   
seems to be about 140.90

Other

9. Number of Baskets of Soil from Locus

Fig. 15(A). Completed locus sheet for a wall (Obverse,  
reduced from 8½ x 11)

H 77 Locus No. 017 Initial F.H Page 1

[illegible][illegible]

During Excavation

"P UNEXCAVATED DURING 1977. BONDS TO 014, 016 AND ASSOC. WITH  
O1P. PRESERVED TO A HEIGHT OF ~ 50cm ABOVE FLOORS 035, 037, 042  
LINK WITH O1P IS CUT. BY BURIAL 007  
SEALED BY 015, 019

11/8 III-B Assoc. WITH WALLS 61.014, 61.016, 61.018, 62.039, 62.043  
Assoc. WITH FLOORS 61.037, 61.035, 61.042, 62.047, 62.053

Fig. 15(B). Completed locus sheet for a wall (Reverse, reduced from 8½ x 11)

Field I Area 61H 77 Locus No. 040.1 Initial F.H. Page 11. Diary of Excavation

28 JUNE - Pit 040 sectioned. E 1/2 of pit 040 is in balk. The N 1/2 of remainder was used for the sectioning process. The Sides + bottom were readily distinguished by an organic residue at pit edges. 3 artificial distinctions - top, middle, bottom were made in excavation - separate pottery + MCR. Set at 50 cm intervals

2. General Description (Attach any Coded Data)

MULTI-LAYERED Loose UNSOERED Fill. 5 LAYERS TO THE PIT  
Partially distinguishable by color: 1) 10YR 7/4 2) 10YR 6/3  
3) 5YR 6/1 4) 5YR 2/1 5) 10YR 5/4. These 5 layers are numbered  
040.2 → 040.6.

In the section - NW 1/4 of pit - no apparent pit lining. EDGES distinguished by change in color, texture, and a thin (1mm.) layer of 5YR 8/1 residue at pit edges. Apparently decomposed organic material.

3. Location in AreaGeneral Data

E 1/2 in E Balk. N 1/2 of remainder used for sectioning of pit

Underlies 026

Overlies

Is contiguous with 036, 040.2 → 040.64. ExtentGreatest length 85 cmGreatest width 87 cmThickness 1.49 meter

Other measurements

5. Section ReferencesE BalkSub Section 28 JUNE, 19776. Top Plan references29 JUNE, 19777. Photo NumbersNONE8. LevelsTop 141.30Bottom 139.81Other9. Number of Baskets of Soil from Locus 123

Fig. 16(A). Completed locus sheet for a pit (Obverse,  
reduced from 8 1/2 x 11)





SKELETAL DATA	1	2	3	4	5	6	7
	71	161	007	3	10	1	3/6
	8	9	10	11	12	13	14
	3/6	6	6	1	2	4	5

GRAVE DATA	1	2	3	4	5	6
	71	161	007	2	1	1
	7	8	9	10	11	12
	1	170	057	070	3	2

Fig. 17. Completed burial code form

The following tabulation gives the annotation classes and the specific attributes included in each class for both skeletal and grave data. It is the field guide by means of which the boxes of the burial code form are filled in.

## BURIAL CODE

## Skeletal Data

Box 1	Year	Given by a two-digit number (e.g., 70, 75, 77, 79).
Box 2	Field and Area	Given by a three-digit number (e.g., 112 is Field I, Area 12).
Box 3	Locus Number	Given by a three-digit number (e.g., 026 is locus 26).
Box 4	Type of skeletal material	1. animal 2. human - sex not distinguishable 3. human - male 4. human - female
Box 5	Age	-1. no record 1. 0-6 months

Box 5	Age (cont.)	<ol style="list-style-type: none"><li>2. 6-18 months</li><li>3. 18 months - 3 years</li><li>4. 3-4 years</li><li>5. 4-6 years</li><li>6. 6-8 years</li><li>7. 8-10 years</li><li>8. 10-12 years</li><li>9. 12-17 years</li><li>10. 17-24 years</li><li>11. over 24 years</li></ol>
Box 6	Articulation	<ol style="list-style-type: none"><li>-1. no record</li><li>1. articulated</li><li>2. disarticulated</li><li>3. disemboweled</li></ol>
Box 7	Right Arm	<ol style="list-style-type: none"><li>-1. no record</li><li>1. pronation</li><li>2. supination</li><li>3. wrist flexed medially</li><li>4. wrist flexed laterally</li><li>5. flexed elbow</li><li>6. arm across chest</li><li>7. arm across abdomen</li><li>8. arm across pelvis</li><li>9. hand on pelvis</li><li>10. hand in pelvis</li><li>11. hand on femur</li><li>12. arm extended</li></ol>
Box 8	Left Arm	Same entries as for right arm
Box 9	Right leg	<ol style="list-style-type: none"><li>-1. no record</li><li>1. abducted</li><li>2. adducted</li><li>3. flexed</li><li>4. medial rotation</li><li>5. lateral rotation</li><li>6. extended</li><li>7. ankle crossed over left</li><li>8. leg crossed over left</li></ol>
Box 10	Left leg	<ol style="list-style-type: none"><li>-1. no record</li><li>1. abducted</li><li>2. adducted</li><li>3. flexed</li><li>4. medial rotation</li><li>5. lateral rotation</li><li>6. extended</li><li>7. ankle crossed over right</li><li>8. leg crossed over right</li></ol>

- |        |                                       |  |
|--------|---------------------------------------|--|
| Box 11 | Direction of eyes                     | <ul style="list-style-type: none"><li>-1. no record</li><li>1. face up</li><li>2. face down</li><li>3. facing north</li><li>4. facing south</li><li>5. facing east</li><li>6. facing west</li><li>7. decapitated</li><li>8. facing north-northeast</li><li>9. facing east-northeast</li><li>10. facing east-southeast</li><li>11. facing south-southeast</li><li>12. facing south-southwest</li><li>13. facing west-southwest</li><li>14. facing west-northwest</li><li>15. facing north-northwest</li><li>16. facing northeast</li><li>17. facing southeast</li><li>18. facing southwest</li><li>19. facing northwest</li></ul> |
| Box 12 | Body position                         | <ul style="list-style-type: none"><li>-1. no record</li><li>1. extended on front</li><li>2. extended on back</li><li>3. extended on left side</li><li>4. extended on right side</li><li>5. flexed on front (kneeling)</li><li>6. flexed on back</li><li>7. flexed on right side</li><li>8. flexed on left side</li></ul>   |
| Box 13 | Position by quadrant                  | <ul style="list-style-type: none"><li>-1. no record</li><li>1. northeast</li><li>2. southeast</li><li>3. southwest</li><li>4. northwest</li></ul>  |
| Box 14 | Orientation (based on head direction) | <ul style="list-style-type: none"><li>-1. no record</li><li>1. north</li><li>2. north-northeast</li><li>3. northeast</li><li>4. east-northeast</li><li>5. east</li><li>6. east-southeast</li><li>7. southeast</li><li>8. south-southeast</li><li>9. south</li><li>10. south-southwest</li><li>11. southwest</li><li>12. west-southwest</li><li>13. west</li><li>14. west-northwest</li></ul>   |

Box 14	Orientation (cont.)	15. northwest 16. north-northwest
Grave Data		
Box 1	Year	Given by a two-digit number (e.g., 70, 75, 77, 79).
Box 2	Field and Area	Given by a three-digit number (e.g., 112 is Field I, Area 12).
Box 3	Locus Number	Given by a three-digit number (e.g., 026 is locus 26).
Box 4	Excavatability	-1. no record 1. totally in area 2. partially in balk - distinguishable 3. partially in balk - not distinguishable 4. totally in balk
Box 5	Number of Skeletons	-1. no record 1. single 2. multiple (2) 3. multiple (3) 4. multiple (4)
Box 6	Vertical relationship to other burials	-1. no record 1. single 2. upper of two 3. lower of two 4. upper of three 5. middle of three 6. lower of three
Box 7	Shape of cist	-1. no record 1. rectangular 2. kidney-shaped 3. pear-shaped 4. oblong 5. circular
Box 8	Length of cist	Three digits; measurement in centimeters
Box 9	Width of cist	Three digits; measurement in centimeters
Box 10	Depth of cist	Three digits; measurement in centimeters

- |        |          |   |
|--------|----------|---|
| Box 11 | Covering | -1. no record<br>1. small fieldstones<br>2. large stones<br>3. stone slabs<br>4. capstones<br>5. fill<br>6. mud<br>7. brick |
| Box 12 | Lining   | -1. no record<br>1. fieldstones<br>2. stone slabs<br>3. fill<br>4. mud<br>5. brick  |

Many of the annotation boxes for grave data and some of those for skeletal data can easily be filled in by the area supervisor. For those boxes where technical expertise is required, the osteologist or bone specialist should be consulted. For some of the annotation classes more than one attribute will be applicable. In such cases the numbers representing all the attributes that are present should be placed in the box, separated by slashes (/).

It should be remembered that the burial code form is a supplement to and not a substitute for the General Description on the locus sheet, and that the entire locus sheet should be filled out for each locus (see p. 70).

#### CHAPTER FOUR: THE AREA SUPERVISOR

Fig. 5 locates the area supervisors within the supervisory staff structure, however this position does not adequately indicate their importance in the excavation process. The area supervisor is the key person in both excavation and recording, and is consequently the key to the success or failure of the expedition. If an area is properly excavated, it is because of the knowledge and diligence of the area supervisor and the care with which he or she teaches the volunteers in the area. The recording of the excavation by the area supervisor is the basis for all future reporting by the excavation staff. The area supervisor's duties and responsibilities extend in two directions (fig. 5): to the volunteers and to the field supervisor.

To the volunteers, the area supervisor is a teacher with responsibility for more than just the mechanics of excavation. A major goal of the volunteer program is education. Volunteers are more than dirt carriers. They are students in an advanced course, and they expect instruction concerning the reasons why tasks are performed and why precautions are taken. The ability to teach method and technique will, in part, determine the success of an area supervisor. At the start of the archaeological season, the area supervisor should explain basic archaeological theory and the proper use and care of tools and equipment to the volunteers assigned to the area. As the work progresses, each volunteer should be rotated into as many jobs and situations as possible, ranging from sifting to recording to tackling tedious excavation problems. Questions and miscomprehensions will occur. Whenever possible, the area supervisor should take the time to instruct the individual volunteer further and to answer questions that may arise. This willingness to explain is very important for morale, as are an understanding of the volunteers' problems, careful rotation of jobs, and a dash of humor.

The area supervisor is responsible directly to the field supervisor whose duty is to direct the overall strategy of the field and to act as a problem solver and consultant for the area supervisors. In consultation with the senior archaeologist and the area supervisors, the field supervisor determines which areas to excavate, the extent to which they will be excavated, and the overall excavation policy of the field. In accord with field directives, the area supervisor determines area assignments, speed of excavation, and emphasis. This leads to the second part of the relationship between area supervisors and the field supervisor. The latter will be watching to correct errors in method and technique on the part of area supervisors. Questions, problems, and alternative courses of action will occur to an area supervisor. When this happens the area supervisor should collect his or her thoughts, determine alternatives, and decide upon the apparent best course of action. The area supervisor should then consult the field supervisor, presenting the problem, the alternatives, and the proposed solution. This should lead to a discussion of the problem with the field supervisor who will undoubtedly have comments, ideas, and further questions. The discussion will often solve the problem, while also serving as an educational experience for the area supervisor.

*Pre-Excavation Preparation*

Prior to going into the field, the area supervisor should obtain the field reports for the past season as well as the area notebook for the area in which he or she will be working. The area supervisor should become familiar with all of this material and note the problems and questions that remain for the area. Careful attention should also be given to the proposed goals for the current season of excavation. A priority upon arrival at the site, or before if possible, is to discuss goals and strategies with the field supervisor.

*Equipment and Tools*

From the season's start to its finish, the area notebook is the area supervisor's constant companion. To allow for maximum flexibility, it is a loose-leaf notebook, but this requires care on the part of the supervisors to prevent loss or damage to its contents. Three kinds of paper are provided for the notebook: graph paper for top plans and sections, locus sheets for field notes, and lined paper for serial lists and reports. These sheets along with a ruler, hard pencil, ballpoint pen, eraser, scratch pad, and felt-tip pen are carried in the area supervisor's kit.

Each area supervisor is provided with a ring binder in which completed sheets are filed. This should be done regularly in order to keep the number of sheets carried into the field at a minimum. The cover of the binder will be marked in such a way as to identify the contents precisely. For example:

Hesi        1971, 1973, 1975, 1977  
Field I Area 51  
Area Supervisors.....John Doe (Locs 1-48)  
                              .....Martha Roe (Locs 49-136)  
                              .....Eric Brown (Locs 137- )

During the excavation process a basic body of equipment is necessary to assist in taking accurate notes and measurements, and for the field labeling of artifacts. These tools include a 2.00 or 3.00-m white-faced or yellow-faced tape, several lengths of good quality cord, four surveyor's spikes, a plumb bob, a supply of blank balk tags, a supply of small nails, balk nails, a 10.00-m cloth tape, a piece of string, a line level, elastic bands, plastic bags, various sizes of small boxes, blank pottery and MC tags, and Munsell Color tags. At the start of each day pottery containers must be carried to the area for the day's use.

Most of this miscellany can be conveniently carried in a wicker basket which is provided by the dig, although some supervisors prefer deep travel bags which are obtainable from most travel agents. All equipment continually in use will be provided by the expedition, and the supervisor should make sure that he or she has access to a trowel, a hand-pick, a large brush, a paint brush, a blower to remove loose particles, and several dental picks. Most supervisors find that their

interests are best served by providing their own trowel and pocket knife for use in the field.

*Field Note Taking and Ceramic Recording*

Pottery will be found in almost every locus. As indicated above (p. 47), ceramic evidence is recorded on the locus sheet. This is not the first step in the ceramic recording process, however. One of the first tasks at the start of a day, or when opening a new locus, is to prepare a pottery container (usually a plastic pail) for every locus that is under excavation. First, the area supervisor consults the pottery container serial list for the area and assigns the next sequential number to the new container (see fig. 18, where 24 would be the next number). Each area under excavation will have its own pottery container serial list, starting at "1" for each year of excavation. Since duplicate numbering will be present between areas, all items must be labeled accurately to avoid confusion. The serial list records the locus number, the date, and a brief description of the locus for each pottery container. The final column, "Field Reading," is filled in during first analysis (see p. 93). The number of each new pottery container is also entered in section 10 of the appropriate locus sheet (see fig. 13, pp. 43-44), along with any pertinent observations. After the pottery has been cleaned and processed in the field (see pp. 90-95), the area supervisor records the pottery identifications for each container in section 10 of the corresponding locus sheet (see figs. 14-16, pp. 49-54, 95).

Next a pottery container tag is filled out and attached to the handle of the pottery pail with a piece of string. This tag is a 3" by 5" card that will accompany the particular set of pottery through the pottery registration process. Fig. 19 is an example of a pottery container tag. Most of the items placed on the tag are already familiar: site, year, date, supervisor's initials, field, area, and locus. The pottery container number is the number taken from the pottery container serial list. The goufa count is the total number of baskets of soil removed from the locus while the particular container is in use. Besides appearing on the pottery container tag, this count is entered under item 9 on the locus sheet (see fig. 13). At the bottom of the tag, a brief description of the locus is given.

Ideally there would be one pottery container for each locus, but this is rarely the case. A new container is begun when a locus is first opened, but new containers are also assigned at the start of each day and when a container in use becomes two-thirds full. Consequently a single locus may be represented by several containers. Except for complete vessels, all pottery is placed in the container assigned for the specific locus. Complete vessels are treated as artifacts and, for field purposes, should be labeled and sent to the material culture registry (see pp. 107-09). The complete vessel should be placed in a plastic bag or plastic pail, so that no soil is lost, and the vessel should receive an MC tag.



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# FIELD I AREA 61

## POTTERY CONTAINER SERIAL LIST

PC #	LOCUS	DATE	LOCATION & DESCRIPTION	FIELD READING
1	038	16/6	Probe Along Center Of N. Balk	Pers*, I1, UD
2	026	16/6	Occupational debris over surface 036	Pers*, I1, EB, UD
3	038	17/6	Probe along center of N. Balk	Pers*, I1, EB
4	026	17/6	Occupational debris over 036 - N	Pers*, UD
5	026	20/6	Occupational debris over 036 - Center	Pers*, I1, UD
6	026	20/6	Occupational debris over 036 - Center	Pers*, I1, UD
7	026	21/6	Occupational debris over 036 - Center	Pers*
8	036	21/6	Occupational debris over 041	Pers*, EB, UD
9	026	21/6	Occupational debris over 036 - South	Pers*, I1, UP
10	031	22/6	Occupational debris over 033 - West	Pers*, I1, LB, UD
11	026	22/6	Occupational debris over 036 - South	Pers*, UD
12	023	23/6	Fall from Wall 017	Pers, LB*, UP
13	031	23/6	Occupational debris over 033 - West	Pers*, I1, UD
14	026	23/6	Occupational debris over 036 - South	Pers*, UD
15	039	23/6	Probe in NE Corner	Pers*, EB
16	031	24/6	Occupational debris over 033 - East	Pers*, EB, UD
17	023	24/6	Fall from Wall 017	LB*, EB, UD
18	023	27/6	Fall from Wall 017	Pers, LB*, EB, UD
19	039	27/6	Probe in NE Corner	Pers*, I1, UD
20	031	27/6	Occupational debris over 033 - East	Pers*, I1, UD
21	040.1	28/6	Top of Pit Section	
22	040.1	28/6	2 <sup>nd</sup> Layer of Pit Section	
23	040.1	28/6	3 <sup>rd</sup> and Bottom Layer in Pit Section	

Fig. 18. Pottery container serial list

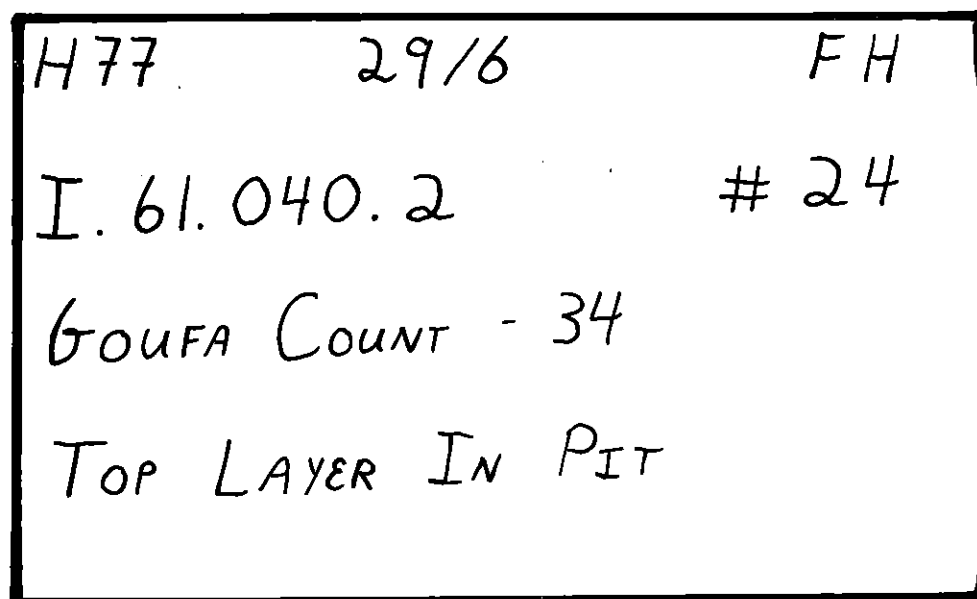


Fig. 19. Pottery container tag

Unfortunately errors do occur in the field. A sherd may be placed in the wrong pottery container. This contaminates the container. If this occurs, use of the container should be discontinued, and a new one begun. The fact that the container is contaminated should be noted on the locus sheet, the pottery container serial list, and the pottery container tag. An effort should be made to isolate the contaminating sherds, but this can seldom be done with certainty. Another source of contamination is digging through a locus into a new one. When this happens, the contamination should be noted as before and a new pottery container should be opened. When in doubt, close the old container and start a new one. It can happen that two containers accidentally receive the same number or that a number is skipped. In the former situation, other information on the container tag will usually reveal which container was incorrectly numbered; in the latter case, it may turn out that a container has been lost. Needless to say, both of these situations should be avoided at all cost. A good practice is to number a batch of pottery container tags serially before entering the field. This allows the supervisor to check the prenumbered tag with the next number on the pottery container serial list, so that the numbers on container tags and in the serial list always agree.

*Field Note Taking and the Material Culture Registry*

Material culture remains will be found in almost every locus. A recording system much like that used for pottery is used for material culture. A material culture serial list (MC serial list) is kept (see fig. 20). There is one MC serial list for each area, and each year the

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FIELD I AREA 61  
MC SERIAL LIST

p3

MC #	Assoc PB #	Locus	DATE	SPECIALIST	MC REG #
56	20	031	27/6	Shell	1801
57	19	039	27/6	Object - Grinding Stone	1797
58	21	040.1	28/6	Bone	1819
59	21	040.1	28/6	Lithic	1847
60	21	040.1	28/6	Mal.	1896
61	22	040.1	28/6	Bone	1818
62	22	040.1	28/6	LITHIC	1848
63	22	040.1	28/6	MAL	1895
64	23	040.1	28/6	Bone	1819
65	23	040.1	28/6	LITHIC	1849
66	23	040.1	28/6	MAL	1897
67	23	040.1	28/6	BOTANIST	1903
68	23	040.1	28/6	Object - Chert BLADE.	1807

Fig. 20. Material culture serial list

list starts at "1". From the list, the next sequential number is taken, and then that number, the associated pottery container number, the locus, the date, and the specialist to whom the sample is to be sent are entered on the MC serial list. Next, item 11 on the locus sheet (see fig. 13) is filled out with the MC number, the associated pottery container number, and the specialist to whom it is sent. Finally a field MC tag is made and placed with the specimen (see fig. 21). Site, year, date, and supervisor's initials are entered on line 1; then field, area, locus, and associated pottery container number are listed on line 2. The field MC number is placed on line 3, and then brief descriptions of the sample and the locus are written at the bottom of the tag.

Field MC numbers should not be carried over from one locus to another. Each locus should have a separate set of MC samples and field MC numbers. However, if a second pottery container is opened in the same locus after the first was filled, there is no reason to assign new MC numbers unless the sample size gets very large. Where sub-locus numbers are being used, as in the case of a pit (see figs. 6, 16), new field MC numbers are assigned for each sub-locus. MC samples may be contaminated in the same way as pottery containers, and the precautions outlined on p. 64 should be observed. No MC material should be discarded in the field. The decision about what to save and what to throw away is made by the specialists. The rule is, "If in doubt, save," and "If in doubt as to contamination, change pottery and MC containers."

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I. 61. 040. 2		# 24
MC # 69		
BONE - FROM TOP LAYER OF PIT		
- SANDY FILL		

Fig. 21. Material culture tag

*Field Note Taking and Photography*

When a photograph is taken in an area, numerous short entries need to be made in the area notebook. First the date, time of day, direction of the photograph, and photograph number must be recorded in section 7 on the locus sheet (see pp. 46-47 and figs. 13, 15) for each locus that is seen in the picture. Then the supervisor enters the data concerning the new photograph on the photography serial list (see fig. 22). This list includes the photograph number which is given to the area supervisor by the photographer, the date, the subject of the photograph including all loci seen in the photograph, and the direction of the photograph. Finally, the supervisor should enter the location, view, and photograph number on the daily top plan (see p. 41 and fig. 12).

When the photographic print is returned to the area supervisor, he or she should mount it on lined paper and place it in the back of the area notebook. Next to the photograph, its number and a complete description of its subject, including locus numbers and arrows pointing to important features, should be given.

*Field Recording of Various Locus Types*

The most time-consuming aspect of the recording process is filling out the locus sheets. A wide variety of locus types will present themselves, and the area supervisor must be prepared to record the relevant material from each locus accurately and in the proper form. The following paragraphs discuss in more detail the nature of the entries to be made by an area supervisor when recording the different types of locus.

*Soil Layers* - Pages 46-47 and figs. 14-16 showed how to fill in locus sheets. Those instructions are most applicable to soil layers. All that needs to be added here is that the descriptions should be as complete as possible and that the supervisor should consult with specialists where identification is dubious. Also, the Interpretive Comments dealing with soil layers are mostly concerned with the origin and function of the layer. In working out these details it is necessary to study carefully the relation of the soil layer to other loci in the area. What loci, if any, cut through the layer? What loci does the soil layer run up against? What loci does the soil layer seal?

*Living Surfaces* - The description of a living surface should include all of the observations made for soil layers. In addition, the General Description should note the material of which the surface was composed, such as beaten earth, lime, plaster, brick, cobbles, or flagstones. The general appearance and the state of preservation of the surface should also be given. If the surface is composed of units such as bricks, cobbles, or flagstones, the approximate size of each unit should be recorded. It is also important to note the type of foundation on which the surface was laid, as well as what remains were found lying on the surface. Under Interpretive Comments the function of the surface is of primary importance. Was it a floor, a road surface, a street, a public area, or a courtyard?

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Field I Area 61  
 PHOTOGRAPHY SERIAL LIST

PHOTO No.	DATE	Locs	DIRECTION
18	15 JUNE	STONE AND MORTAR WALL <u>017</u> <sup>6</sup> AM	S
49	17 JUNE	FALLEN STONE <u>023</u> , WALL <u>016</u> <sup>5</sup> PM	SE
123	22 JUNE	DOOR SOCKET IN SITU <u>035</u> <u>016</u> <sup>6</sup> AM	S
307	30 JUNE	FIRE PIT <u>034</u> - 8 AM	NW
423	1 JULY	STONE AND MORTAR WALL <u>017</u> <sup>11</sup> AM	N

Fig. 22. Photograph serial list

*Walls* - The general description of a wall begins with the material of which it is composed, usually stone or brick, and should also describe the size and materials of these components. If the wall is brick, the composition of the individual bricks should be discussed, e.g., whether they are made with straw and whether they are sun-dried or kiln-fired. If the walls are stone, are the stones local? If not, where do they come from? Next the manner of construction should be described so that the following questions are answered in a systematic fashion, beginning with what can be learned from an examination of the exposed top of the wall. Is the wall composed of a single row of stones, of an inner and outer face with rubble or small stones between, or of a solid stonework? Are the stones laid in any discernible pattern? Are they unworked fieldstones, or have they been dressed on one or more faces? Examination of the face of the wall will reveal additional details. How many courses are preserved? Is the construction of the preserved portion of the wall uniform from the top to bottom, or are there observable phases? Was mortar used? What type? On what kind of foundations does the wall rest? How many courses are preserved above the floor level? Are there thresholds or passageways which may have been doors? Are there windows? With what other walls does this wall corner? Does it bond with these walls or simply butt against them?

The Location in Area, Extent, and Levels for walls should include length, width, height, distance from floors or surfaces to the preserved top of the wall, the positions of windows and doors, and the sizes of bricks or stones used in the wall. Under Interpretive Comments attention must be given to identification of the locus which seals the wall and the locus which underlies it, as well as the relationship of the wall to all contemporary surfaces.

*Pits* - A pit is a locus, and its constituent parts and contents represent sub-loci (see p. 23). The General Description of a pit locus begins with the shape of the opening to the pit and should include whether or not it was once covered. If the opening has been protected in any way, as for example by a low wall, that protection should be described. The General Description of the sub-loci is more concerned with their contents. Each layer, as a sub-locus, should be described in the same way as a soil layer. Special attention should be given to the bottom layers, since they may represent accumulation in the pit while it was still in use. When the excavation has been completed, the shape of the pit and its relation to its constituent sub-loci should be noted under General Description for the main pit locus entry.

Entries under Extent and Levels vary greatly with the shape of the pit, but the supervisor need not produce lengthy tables of numbers because the pit should appear in section. The main concern of the excavator is the depth, diameter, and contents of the pit.

In addition to the standard interpretive questions, identification of the locus from which the pit was dug and of the locus that seals it is important. The layering in the pit along with its contents should be

carefully scrutinized for evidence of stages in the filling in of the pit.

*Trenches* - A trench is recorded in the same manner as a pit with whatever modifications are required by the size, shape, and function of the trench. For example, if the trench represents a robbed wall, the supervisor seeks to extract from it all of the information that can be obtained about the original wall, and the recording system is adapted with this in mind. In a similar manner, foundation trenches are recorded with an eye towards preserving all of the data concerning their relationship to the walls which occupied them.

*Pit Burials* - Pit burials are simply another type of pit. In this case there are three important aspects to note: the grave itself, the skeletal remains, and the grave furnishings. Most of the information concerning the grave and skeletal remains is placed on the burial code form (see pp. 48, 55-59) which should be attached to the locus sheet. The soil in the grave should be treated like the contents of a pit where the various stages of the grave are treated as sub-loci. The grave furnishings belong to the category of objects, and the supervisor should record their relationship to the skeleton. In doing this a sketch may help. Official photographs will be taken of every skeleton, and official drawings may be required in certain cases. If the burial is not connected to a main section, the supervisor may need to produce a subsidiary section to demonstrate the burial's stratigraphic position. Interpretive Comments should concentrate on stratigraphic position and on the types and positions of any artifacts, since they may relate to the burial ritual or to practices performed at the time of interment.






The area supervisor must take care to be as precise as possible in the description of burials, especially in avoiding ambiguity. He or she must be sure to use the words "child" and "infant" in the manner prescribed by the osteologist, since the two terms carry specifically different meanings. The term "articulation" should also be used with care and only to refer to the condition of bones in a burial that are found in the natural order of a living body and that were not rearranged by accident or for secondary burial.

*Installations* - A great variety of installations may appear in an area. Therefore no general rules for recording can be set down. The record depends on the ingenuity of the supervisor, applied in the light of analogies provided by the more common types of locus.

*Notebook Shorthand* - Some area supervisors may wish to facilitate quick reference to their notes by using symbols to identify the various types of loci. This symbol system will not appear in the official reporting or publications. It is merely a shorthand method that can be used to indicate the kind of locus to which the particular locus number refers.

Wall ☐ , e.g., ☐ , wall, locus number 004  
 Surface ☐ , e.g., ☐ , surface, locus number 017



Floor , e.g., 15, floor, locus number 015  
 Installation , e.g., , installation, locus 018  
 Pit , e.g., , pit, locus number 020

If the supervisor adopts this symbol system, it should be used consistently. New symbols should not be introduced without the approval of the senior archaeologist. A circle should not be used as a shorthand symbol, as this is the official symbol for features and structures.

#### *Contamination and Cleanliness*

All the previous comments concerning the recording of archaeological material are negated if materials are contaminated in the field. The surface of an area must be kept as free from loose earth as possible at all times. Piles of dirt in an area make it impossible for any supervisor, or volunteer, to see the locus which is being excavated; digging blind is asking for confused results and failure to recognize new loci as they appear. When the area supervisor wishes to examine a locus with particular care, and always when passing from one locus to another, he or she should have the surface thoroughly swept with straw brooms. This brings out as many features as possible and eliminates sources of future contamination. When the area is being prepared for photography, it must be meticulously cleaned so that absolutely no loose earth, footprints, or pieces of equipment will appear in the photograph. Loose earth (among the stones of a wall, for example) should be removed so that the details of the feature will clearly stand out in the photograph.

In order that no pottery fragments or other objects are accidentally kicked into the area, a one-meter-wide strip on the balks that surround the area should be swept clean at least twice a day. As far as practicable, traffic should be kept off this meter-wide strip to prevent the breaking away of the edges of the balk.

Care must be taken to insure that pottery is placed in the proper pottery container. Proper and immediate labeling of pottery containers and the physical separation of work progressing at different loci are essential. One sherd in the wrong pottery container will contaminate all its contents. If contamination does occur, the pottery container should be closed and marked "Contaminated" on its tag, on the locus sheet, and on the pottery container serial list. If there is doubt about possible contamination, the pottery container should be closed and marked "Possibly Contaminated" as above.

#### *Volunteer Digging Crews*

The volunteers are organized into area groupings by the field supervisor in consultation with the area supervisors. These groupings will, in general, last for the entire season. If excavation operations are to proceed smoothly, the area supervisor must organize and direct the volunteers and give attention to the points at which the volunteer chain is most likely to break down. This can happen when

- 1) filled baskets of earth are removed too slowly and the empties are not returned soon enough to the point of excavation;
- 2) a lag between the loosening of earth and its removal from the area leads to an accumulation of loose earth there;
- 3) earth is excavated faster than it can be screened; or
- 4) an operation requiring a technical man and a few removers leaves others idle in the area.

The area supervisor should try to anticipate such problems and be prepared to reassign individual volunteers as necessary for earth-removal or to provide alternate tasks that will take up the slack. If any of these problems become acute, the area supervisor should consult with the field supervisor.

#### *Interaction with the Field Supervisor*

As implied before, the area supervisor has many topics which demand consultation with the field supervisor. These range from the mundane question of the location of storage areas to excavation strategy to problems with volunteers.

In consultation with the area supervisor, the field supervisor will determine the position of the stairway or ladder into the area. It will probably be placed against the least important balk, so as not to hinder the operations in other areas. This stairway will be a prime source of possible contamination and should be kept as clean as possible. It should be swept down at frequent intervals, and the materials gathered in this operation should be discarded.

Every four areas should have a space where completed pottery containers and material culture specimens can be stored. This space is to be clear of stones and vegetation, and should be marked off with a row of stones. No completed pottery container or material culture specimen should be allowed to remain in an area, but should be removed to the storage space until it can be transported to the field laboratory for processing. The storage space should be located by the field supervisor in conjunction with the area supervisors who will use it. When using this storage space, the area supervisor should check each tag for accuracy before the specimen leaves the area, and again as it is removed to the field laboratory.

Excavation strategy has been touched on before. Little need be said here, except to emphasize that the field supervisor is both a resource person to be used in solving strategic problems and also the top authority for the field who will stop any ill-conceived excavation strategy.

The surveyor/architect, the photographer, and the specialists are people who are in continuous demand from all segments of the dig. For

maximum utilization of their services, an area supervisor should anticipate his or her own needs and inform the field supervisor of them. In conjunction with the senior archaeologist and other field supervisors, schedules for these professional services will be planned. While all needs cannot be foreseen, they should be anticipated as fully as possible.

Under the extreme and close conditions of an archaeological excavation, personality and physical problems may appear. Problems among certain volunteers and possibly among various area supervisors may also develop. These problems could affect the progress of the excavation and should be brought to the attention of the field supervisor or as a final resort the director of the expedition for aid in their resolution.

#### *Timetable of Duties*

*Daily* - Each evening the area supervisor should review the locus sheets, serial lists, and daily top plans, check them for completeness, and make sure that a completed and accurate top plan is ready for use during the next day's work. Usually a brief discussion on strategy with the field supervisor is in order. The area supervisor should also check his or her equipment and supplies in order to restock depleted items for the next day's use. Finally, the area supervisor should attend the daily reading of the pottery from his or her area (see pp. 91-93).

*Semi-Weekly* - All pottery container numbers and material culture numbers are eventually returned with analysis and registry numbers (see pp. 95, 99). On a regular basis this information should be placed on the locus sheet, under "Pottery" and "MCR," in order to prevent great quantities of work piling up at the end of the excavation season.

*Weekly* - Each week the area supervisor should check over the area notebook and make sure that all parts are completely up to date. As loci are completed they should be summarized on locus summary sheets. The locus summary sheets will be part of the final report, but they can and should be prepared as the loci are completed. Fig. 23 is the locus summary sheet for I.61.040.1 which is described fully in fig. 16. The categories on the summary sheet are basically the same as those on the locus sheet, but they present the material in an abbreviated form which can be used as a summary or for an index of loci. As the supervisor prepares the locus summary sheets, he or she should start organizing the loci into phases. This preparation will greatly facilitate the preparation of the mid-season and final reports, and should stimulate ideas concerning the relationships and uses of the various loci.

*Mid-Season Report* - Halfway through the excavation season, the area supervisor is expected to produce for the field supervisor an up-to-date area notebook, locus summary sheets for all loci, and a mid-season report. This report is a detailed summary of operations for the entire season to date. In it the area supervisor comments on all loci and attempts to place them into phases. The report goes beyond mere

I. 61

Locus	Interp.	Phase	Contemp. Loci	Pottery	MCR
040.1	Pit Fill SECTION OF 040	IV-B	040, 036, 017, 018, 033, 035, 037	3018 - 3036 3037 - 3052 3053 - 3079 Pena, I, MB, EB, UD	1819 - Animal Bone 1847 - Core 1846 - 28 Snail Shells 1818 - Animal Bone 1848 - 6 Flakes 189 - 17 Snail Shells 1817 - Animal Bone 1849 - 2 Coras, 11 Flakes 1897 - 6 Snail Shells
	Gen. Descript.	Rel. Position	Levels		
5 LAYERS OF LOOSE UNSORTED PIT FILL		Under - 026 Over - Continues 036, 040	t. 141.30 b. 139.81		
Photo	Top Plan	Section	Comments		
NONE	29 JUNE, 1977	E. BALK Sub. SECTION 28 JUNE, 1977	SECTION OF PIT 040 SEE 040 and 040.2 → .6		

Fig. 23. Locus summary sheet

description and should be a careful and considered presentation of the supervisor's interpretation of what has been uncovered. When uncertainties are present, they should be clearly identified and the alternative interpretations discussed. The report should also include phase plans for each phase and the proposed strategy for the remainder of the season. The final page is a brief list, with one-line descriptions, of all loci encountered.

*Final Report* - The final report is a larger and final version of the mid-season report. All segments of the area notebook, the locus summary sheets, and the one-line descriptions of all loci should be complete. The final report should be a comprehensive study of the whole season's work. It should be organized according to phase and should include phase plans. Strategy for future seasons should be discussed and, to assist the next season's supervisor, a list of open loci should be included for reference. The final duty of the area supervisor is the preparation of volunteer evaluations. The area supervisor should compose a half-page report describing each volunteer under his or her direction. This report should include strengths, weaknesses, potential supervisory capability, and recommendation as to the volunteer's suitability for future archaeological digs. In many cases this report will be used to help assign an academic grade for the student volunteer.

## CHAPTER FIVE: THE FIELD SUPERVISOR

Field supervisors are the unifying influence on a dig. They direct and focus the attention of the various area supervisors towards common objectives by organizing each one's duties and responsibilities. In fig. 5, the field supervisor appears as middle staff, analogous to a departmental head in an organization. The field supervisor must fit his or her field into the general framework, goals, and strategy of the dig as set forth by consultation among the senior staff, the senior archaeologist, and the director of the expedition. The overall methods employed to achieve these goals are subject to discussion with the senior staff, but their implementation and the interpretation of results rest with the field supervisor.

Area supervisors are responsible to the field supervisor. In consultation with the senior staff, the field supervisor sets goals, tempo, and overall strategy for the field. Once this information is given to the area supervisors, they are expected to exercise independence in the specific implementation of overall policy. Questions of method and theory will frequently arise, but unless the area supervisor is following a patently incorrect course, the field supervisor should encourage some experimentation concerning method and technique.

Volunteers are not under the direct control of the field supervisor. He or she must not be involved in either the specific task assignments of particular volunteers or the immediate supervision of an individual area, lest the area supervisor's proper authority be undermined. The field supervisor should communicate suggestions and orders privately to the area supervisors, not directly to the working teams, but should remain willing to give advice on technique to the volunteers and answer their questions.

### *Pre-Excavation Preparation*

Prior to entering the field, the field supervisor must become familiar with the goals, problems, and personnel of his or her field. First, the specific goals and strategies of the expedition as a whole must be discussed among the senior staff. Once the priorities of the field have been ascertained, a decision can be made as to the number of areas and volunteers needed to achieve the goals. Second, the field supervisor must study all relevant material concerning the field. This study may be quite time-consuming, since it will include preliminary reports, field reports, area reports, area notebooks, and relevant strata at other sites in the vicinity. The immediate focus of the study should be goals and strategy for the coming season. Third, after the area notebooks have been studied by the various area supervisors, an area-by-area discussion of problems, methods, strategy, and goals should be conducted with each one.

*Field Notebook and Reporting*

Other than implementation of strategy and consultation, the main duties of the field supervisor are interpretation and reporting. The end result of this process is a final report for the field that is organized by phase and that includes all areas in the field. Field supervisors are encouraged to show independence and originality in their analysis and interpretation. The field supervisor has considerable latitude in deciding the type of written record to keep, but the system described here will aid even the most experienced field supervisor in preparing the final report.

Since most of the detailed information about the field is contained in the area notebooks, the field supervisor need keep relatively few notes. An alert field supervisor will know the contents of the area notebooks for the field and will have had a part in determining what was recorded there. The field supervisor's distinctive interest is in the use which the ancient inhabitants made of the space represented by the field. That is, he or she is concerned with the identification and interpretation of coherent units of occupational use. Such units may for convenience be referred to as "structures." The two principal functions of the field supervisor's notebook are (1) to relate the various loci to the structures of which they are a part, and (2) to give an overall picture of the field at each stage of its stratigraphic history.

The field supervisor's first step in analysis is the merging of loci into "features." A feature is a single coherent element of the ancient city; it may be a room, a courtyard, a pit, an installation, or a wall. A feature may be confined to one area or extend over several areas. The study of loci and their grouping into features can begin as soon as they have been excavated. If one floor, wall, or other structural element has been excavated under two or more locus numbers (either within one area or in several areas), the field supervisor will group these loci as a single feature under the number of the locus in which the feature is best seen or in which it was first seen.

The easiest way to record such groupings is on a "Feature Listing Sheet." This is simply a listing of all loci excavated in a field, with cross references to feature groupings (see fig. 24). Locus numbers chosen as feature numbers are enclosed in a circle, e.g., (61.017).

On the "Feature Listing Sheet" all the loci of the field are serially listed in the left-hand column. Those locus numbers that are designated as feature numbers are circled. In the second column, (1) if the locus is a feature, then all loci in the feature are listed, and (2) if the locus is not a feature, then the number of the feature to which it belongs is listed and circled. This column is left blank for probes and one-locus features. The third column contains a short description of the locus. The fourth column lists the number of the structure to which the feature belongs (see below). If the feature or locus does not belong to a structure then this space remains blank. The fifth column

# FEATURE LISTING SHEET

## Field I Loci

Area & Locus	Feature / other loci	DESCRIPTION	STAGE No	PHASE
(61.017)	61.014, 61.016, 61.018, 62.063, 62.043, 62.068, 637	STONE WALL	(6)	III-B
61.018	(61.017)	STONE WALL	(6)	III-B
(61.019)	61.024, 61.025	FILL		III B/A
(61.020)	—	BURIAL	—	II
61.021	—	PROBE	—	—
61.022	(61.026)	Occup. Debris	(6)	III-B
61.023	(61.027)	Coll. STONE WALL	(6)	III-B
61.024	(61.019)	FILL		III B/A
61.025	(61.019)	FILL		III B/A
(61.026)	61.022, 61.032, 61.031	Occup. Debris	(6)	III-B
(61.027)	61.023, 61.030	Coll. STONE WALL	(6)	III-B
61.028	—	PROBE	—	—
61.029	(61.034)	ASH POCKET	(4)	III-B
61.030	(61.027)	Coll. STONE WALL	(6)	III-B
61.031	(61.026)	Occup. Debris	(6)	III-B
61.032	(61.026)	Occup. Debris	(6)	III-B
(61.033)	61.036, 62.083, 62.047	Outdoor LIVING SURF.	(4)	III-B
(61.034)	61.029	FIRE PIT	(6)	III-B
(61.035)	61.037	INTER. FLOOR	(6)	III-B
61.036	(61.033)	OUTDOOR SURF	(4)	III-B
61.037	(61.035)	INTER. FLOOR	(6)	III-B
61.038	VOID	VOID	—	—
61.039	—	PROBE	—	—
(61.040)	—	PIT	(4)	III-B

Fig. 24. Field supervisor's feature listing sheet



(Phase) is filled in when the locus is entered into the phasing framework of the site.

While loci can be listed and merged into features as they are excavated, information concerning structures cannot normally be recorded until the excavation of a structure is far enough advanced for its character to be clear. A "structure" is a group of "features" which, when taken together, form a major structural unit in the field during one of its phases. Houses, roads, defensive wall complexes, or water tunnels would be examples of structures. Occasionally a structure may consist of a single locus and be confined to a single area. More often, a structure involves several features, each of which consists of several loci, and extends over two or more areas.

Once a structure has been definitely identified, the field supervisor assigns it a structure number and begins a "structure sheet" (fig. 25). This sheet is headed with the site, year, structure number, and field supervisor's initials. Structure numbers are assigned sequentially beginning with "1" for the first structure of the initial season. For ready identification, structure numbers are enclosed in a circle. The remainder of the structure sheet is designed so that the two sides of the page are used for the two main types of entries that need to be made. The front of the page defines the structure by giving its location and description and by indicating where in the area notebooks more detailed information may be found. The reverse side details the relationship of the structure to other structures in the field and records the interpretive comments of the field supervisor.

Structures are normally defined by reference to their function, and include house complexes, public buildings, streets, courtyards, cemeteries, industrial complexes, and pit complexes. The first item on the structure sheet, "Component Features and Location in Field," identifies the function of the structure, lists all features involved in it, classifies them by function within the structure, and locates the structure in a general way within the field. When citing locus or feature numbers in the field notebook, the supervisor must always include the number of the area to which the locus belongs (e.g., 61.017, not simply 017). The second item, "General Description," details the mutual relationships of the loci involved and describes the units of the structure in general terms. The entry "Section References" lists all sections on which any part of the structure can be seen. "Top Plan References" indicates the area top plans on which the various elements of the structure are best represented. "Photograph Numbers" lists all photographs taken of every segment of the structure. "Internal Phasing" discusses whether the structure went through more than one phase. Repair of walls and relaying of floors are examples of internal phasing. The stratigraphic evidence on which the internal phasing is based should be given in detail.

On the reverse side of the sheet, "Phasing with the Rest of the Field" relates the structure to other contemporary structures in the field and discusses its place in the phasing of the field as a whole.

H 77 FIELD I STRUCTURE NUMBER ⑥ INITIALS JAB

1) Component Features and Location in field

House Complex

Wells: 61.017, 61.014, 61.016, 61.018, 62.027, 62.031, 62.039, 62.043  
62.063, 62.068

Int. Floors: 61.035, 61.037, 61.041, 62.056, 62.053, 62.069

Located on both sides of the 61-62 balk, east well as west (see removal 23/7/77)

External surface (SR ④) borders it on the south.

2) General Description - The complex consists of 2 complete and 2 partial rooms. The E room is bordered on the S, E, and N by 61.017. Its internal surface is 61.035, 61.037. Its external surface are 61.033, 61.036. A door with a socket in place led from this room to 61.033. W of this room is a second room, with 61.018 as the common wall. Its N well is 62.039/62.068. Its north well is 62.043/62.063. Its W well is 62.031. A door with a socket in place leads to S to outside surface 62.047, and a door (without socket) leads to W to a small room with surface 62.056 and W well 62.027. The small room may prove to be a corridor. The outside surface 61.047, 62.083, 61.033, 61.036 with pits 61.034 61.040 are now assigned to SR ④ - courtyard. Tiny portions of a room with floor 61.041 were found N of 61-62.

3) Section References N. balk 61, 62, W Balk 61, E Balk 62  
sub. section 61.017 (20 June 1977) and  
sub. section 62.031, 62.039 (15 July 1975)

4) Top Plan References 62 loci appear on final top plan - 1975  
61 loci are best shown on June 28, 1977  
Also see balk removal, 61-62 balk, July 23, 1977

5) Photograph Numbers 1975 - #5, 19, 84  
1977 - #103, 124, 160-164, #423

6) Internal Phasing (with reasons)

There is little evidence for more than one phase.  
All well corners are rounded, except for the junction of 62.027 and 62.031. 62.037 and the corridor (?) it forms may, therefore, be a later addition to the building. The interior floors have not been excavated, hence, no phasing data is yet available from this source.

Fig. 25(A). Field supervisor's structure sheet (Obverse, reduced from 8½ x 11)

## 7) Phasing with the Rest of the field (with detailed argumentation).

Probes against 61.017, 62.027 and 62.043 show a foundation trench directly below 62.047 and 61.036. All floors are covered with a rich dark humus (61.031 and 61.030). The same layer seals pit 61.040 and fireplace 61.034. 61.036 is the surface in use with pit 61.040, and 61.033 was in use with fireplace 61.034, but both surfaces are contemporary with 61.017. Therefore, structure (6) (house complex) is contemporary with structure (4) (courtyard). Contemporary structures in 71 and 72 are lost because of later terracing. Walls 61.018, 61.014, 61.016 and floors 61.035 and 62.053 are sealed by ash layers 61.015 and 62.019, which represents phase III-A activity. Hence, Structure (6) (and STR (4)) belong to Phase III-B.

## 8) Ceramic and MC Evidence for Dating

The latest pottery associated with this structure is Persian. The only exception is that LB pottery predominates in fall from 61.017, although one or two possible Persian shards were present. Conclusion: the complex is Persian in date. Clay for the mortar came from an LB occupation. 5<sup>th</sup> Cent. BC imported Greek pottery is present, and a silver Athenian "Owl" coin (possibly 5<sup>th</sup> Cent. BC) (reg #1313). Nothing later than ca 425 BC.

## 9) Comparable Structures from Literature

The remains are too limited to allow for reconstruction of the total plan of the complex. The only similar structure found was in City VIII from Bliss's earlier work at Tell al-Hesi, see page 111. Bliss's structure was brick, and the stone walls of this structure are anomalous for a Persian structure at Hesi.

Fig. 25(B). Field supervisor's structure sheet (Reverse, reduced from 8½ x 11)

"Ceramic and MC Evidence for Dating" deals with the absolute date of the structure on the basis of the available evidence. "Comparable Structures from Literature" is a brief indication of similar structures found on other sites or elsewhere on the same site.

The second important element of the field notebook is phase sketches (fig. 26). These drawings show the layout of all structures contemporary with one another, their location in the field, and their relationship to one another. These sketches should be on graph paper, but need not be drawn stone-for-stone or to a surveyor's accuracy. They are intended to aid the supervisor's memory and to illustrate the field notebook, but are not plans for publication. Official plans will be prepared by the surveying staff, but good notebook sketches can be of considerable help to the architect in this process. The scale normally used in field notebook sketches is 1:50, but the size of the field may require the use of a smaller scale. In a fashion similar to that of the daily area top plan, a record of field photographs is entered on the phase plans. When a photograph is taken of a whole field or of a structure in that field, the location and angle of view should be placed on the phase sketches as well as the photograph number (see p. 41).

A good deal of flexibility is necessary in keeping the field notebook. Excavation may reveal unexpected connections between structures, and what was originally believed to be independent may prove to be an integral part of another structure. To deal with these changes in interpretation, the field supervisor must systematically cross-reference the structure sheets with such entries as "Structure ③ should be combined with Structure ⑥" or "Street ④ forms the W. boundary of Structures ③ and ⑥." These cross-references should be placed on the sheets for all affected structures, not just one of them. The cross-reference entries are best made in red ink, so that they will stand out from the rest of the sheet. Immense structures may also be encountered. In these cases the field supervisor may wish to divide the structure into sub-structures and use separate structure sheets to describe each one. These sub-structures could then be combined on another structure sheet.

Copies of all field photographs will be returned to the field supervisor by the photographer. These photographs should be mounted and grouped by structure in the field supervisor's notebook. Next to each photographic print the photograph number and a comprehensive description of its contents should be entered by the field supervisor.

The field notebook is a loose leaf binder with a title similar to that of the area notebook (p. 61), but without area designation. In it are kept structure sheets, phase sketches, and any other notes which the field supervisor makes during the season. The field notebook should be organized by phase.

The desired end result of this analytical process by the field supervisor is a final field report. This report should be in such a form that it could be immediately published as a preliminary report of

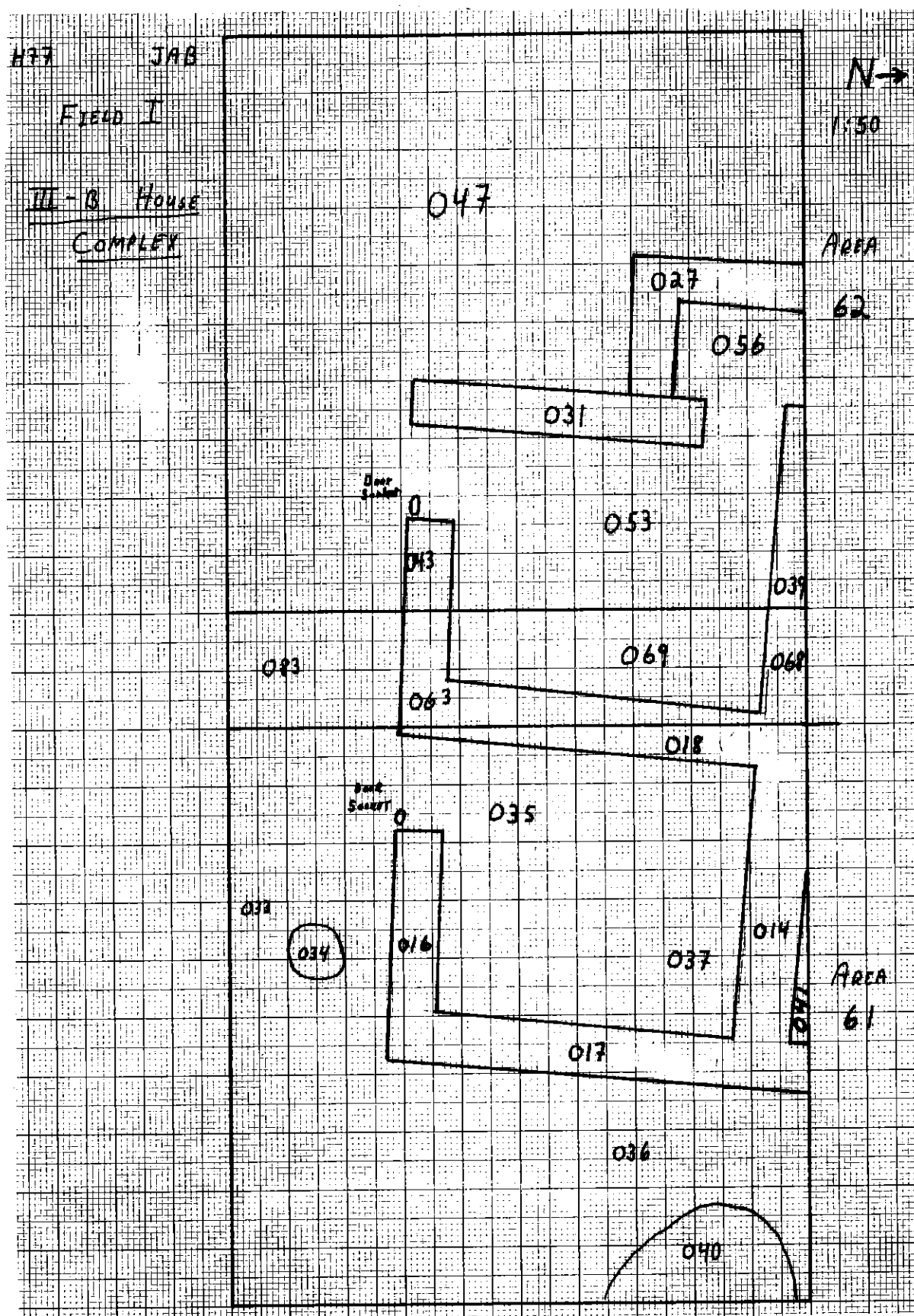


Fig. 26. Field supervisor's phase sketch

the field. It should be organized by phases over the entire field, and a phase plan should illustrate the discussion of each phase. The final section of the report should deal with problems of and future strategy for the field. Two appendices should be attached to the report. The first is the "Feature Listing Sheet," and the second lists and describes all photographs taken in the field.

#### *Timetable of Field Duties*

*Daily* - Each day the field supervisor should consult with area supervisors and discuss problems and strategy with them. He or she should then update the field notebook and prepare sketches as needed. The field supervisor should keep in touch with the field laboratory in order to examine any important material culture items from the field and to discuss their significance with the appropriate specialist. Also, the field supervisor should attend pottery reading for his or her field.

*Intermittently* - The individual area notebooks should be checked for quality and completeness. At appropriate intervals, the field supervisor should check sections being drawn by the area supervisors and make sure that the position of features on drawn sections corresponds to their position on the top plans, that the sections match at the corners where they intersect, that subsidiary sections match the line of intersection with the main balk, and that sections drawn where balks are removed match both main sections which they join.

*Mid-Season Report* - Halfway through the season a progress report will be prepared. It includes all activities in the field and is based on the area notebooks, the field notebook, and the general knowledge of the field supervisor. It should be organized as a small version of the final field report.

*Field Reporting* - The specific contents of the final field report have been discussed previously (pp. 82-84). Other final duties include checking the area notebooks and the final area reports for completeness. When this check has been made the field supervisor should hand over the field and area notebooks to the senior archaeologist. The field supervisor should also prepare evaluations of his or her area supervisors. These evaluations should discuss leadership, quality of work done, reporting abilities, and personality as they relate to the field work of the various area supervisors. Recommendations for future advancement or for severing the expedition's relationship with the individual area supervisor should be made and supported with specific reasons. The field supervisor should also examine the area supervisor's volunteer evaluations and comment where necessary.

## CHAPTER SIX: SENIOR ARCHAEOLOGIST

The senior archaeologist is responsible for the overall strategy, methods, and tactics of the excavation (see fig. 5) and works hand in hand with the director of the expedition. The director of the expedition has the final word on all non-archaeological matters and coordinates all areas of concern to the expedition: archaeology, the field laboratory, camp life, money, guests, and tours. These two people, along with the administrative director (see Appendix Three), will frequently discuss archaeological goals and tactics with reference to availability of staff, volunteers, money, and time.

Fig. 5 shows the senior archaeologist as the supervisor of the field supervisors. In this capacity the senior archaeologist is a sort of vice-president in charge of archaeology. As in most organizations, this makes the senior archaeologist the one who solves major problems, sees that all tasks get done, sets priorities, and writes reports. The senior archaeologist normally visits each field at least twice during the working day to oversee operations. On these visits the chief role of the senior archaeologist is as a questioner and consultant to the field supervisors and area supervisors. He or she will be available during the weekend study sessions to advise on any problem with which the field staff is concerned, and will be prepared to attend field meetings at which his or her presence is required. From time to time the senior archaeologist will hold meetings of the entire supervisory staff so that all members of the expedition can be kept up to date on the progress of the work as a whole.

### *Pre-Excavation Preparation*

One of the main duties of the senior archaeologist occurs before the digging season. This task is the review of previous work and the determination of archaeological strategy. This is done in conjunction with the director of the expedition, volunteer director, field supervisors, administrative director, and specialists. As the season progresses, new discoveries will demand rethinking and modification of strategies and goals. At such points the senior archaeologist must organize insights and provide direction for the excavation.

### *On-Site Duties*

Few hard and fast duties are required of the senior archaeologist. Daily responsibilities include the observation of activities in all fields and the recording of this progress in a notebook. This notebook does not record any archaeological data, but is a diary of events that accompanies the progress of the excavation. It includes questions, comments, strategies followed in the course of excavation, and interpretive notes on the site as a whole. This notebook is a quick and handy reference source for the problems met, the solutions adopted, and the overall analysis of the results of the season's work.

Other duties include the examination of mid-term and final reports from the field supervisors, area supervisors, and specialists. All reports and notebooks, therefore, should be turned in to the senior archaeologist when final reporting is complete. The senior archaeologist also works closely with the surveyor/architect in determining time priorities for the latter and in overseeing the preparation of official plans and sections.

#### *Post-Dig Duties*

All activities of the senior archaeologist are in preparation for writing the preliminary report, subsequent articles, and final publications. The preliminary report is the final task of the excavation season. This report, which is required by the Department of Antiquities and by the American Schools of Oriental Research, is prepared by the senior archaeologist working with the director of the expedition. The report describes all activities of the expedition. Also required by the Department of Antiquities are summary lists of objects and pottery.



## CHAPTER SEVEN: FIELD LABORATORY

The field laboratory is the first step in the examination of artifactual evidence; it functions in two ways. First, all artifactual evidence and specialist samples are recorded in a way that allows rapid item by item retrieval, but that is still sufficiently structured to provide systematic cataloging for samples of widely varying nature. Second, where possible, preliminary analysis of artifacts and samples is conducted on the site, so that the results can be entered into the catalogue and rapidly reported to field personnel. This initiates interaction between specialists and archaeologists, and promotes a problem-solving process in which scientific and stratigraphic analysis can be combined while still in the field. The approach to archaeological problems from a variety of perspectives often leads to modifications in excavation technique, designed to recover a maximum of data.

This expanded role of the field laboratory, as opposed to the older function of simply registering or cataloging artifacts, means that every member of the expedition team may be involved in the cataloging, analyzing, and integrating process. Field staff excavate the material, record its location, and note the preliminary analysis. Specialists analyze the material and disseminate the results. Registrars record the material, later record the analysis, and finally send the results back to the field staff. This universal involvement in the process of recording and analysis is one of the key features of the Hesi method.

The staff organization of those directly involved in the field laboratory's recording and cataloging process is outlined in fig. 27. For a more complete picture, fig. 27 should be viewed along with the field staff chart (fig. 5) and the flow charts of the pottery and material culture registries (figs. 28 and 31).

Hesi employs two principal registries: the pottery registry and the material culture registry. In theory, pottery should be included in the material culture registry since pottery is an important aspect of the material culture of a society. In practice, pottery is separated from the remaining material culture because the larger quantities of pottery which are found would overwhelm the other categories of material culture. Moreover, since different types of analytical results can be derived from the ceramic analysis, such as the date of manufacture and the location of the clay sources used for the vessel, this division allows the pottery registry to have a suitably specialized recording system. Since the pottery registry is relatively less complex, it will be presented before the material culture registry.

### *Pottery Registration Process (cf. Bennett 1974: 209-214)*

Various aspects of the pottery registration procedure have been encountered in previous sections. A flow chart of the entire process from excavation to storage appears in fig. 28. This graphically represents the steps that will be examined in more detail below. Due to

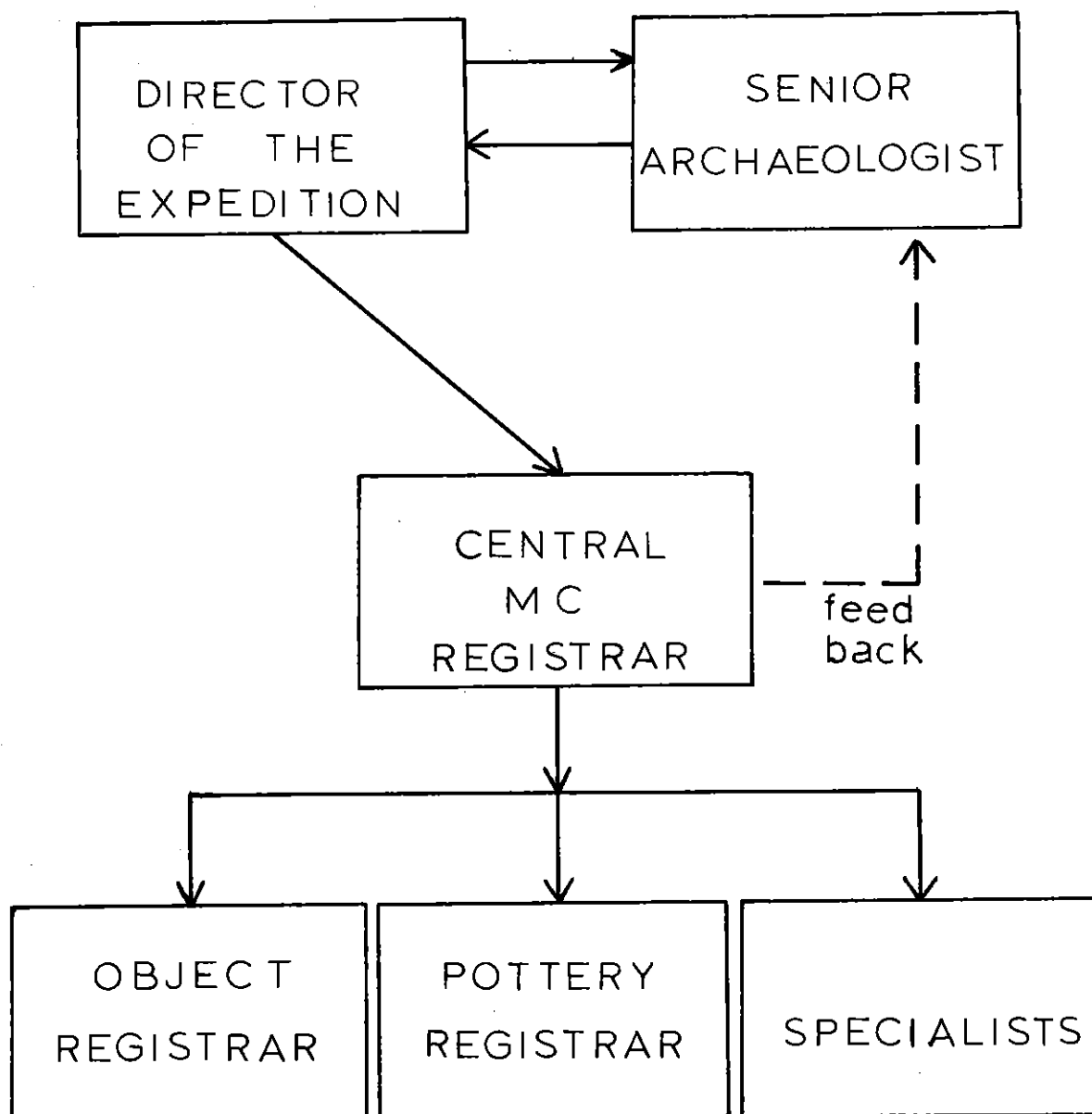


Fig. 27. The lines of responsibility of the field laboratory

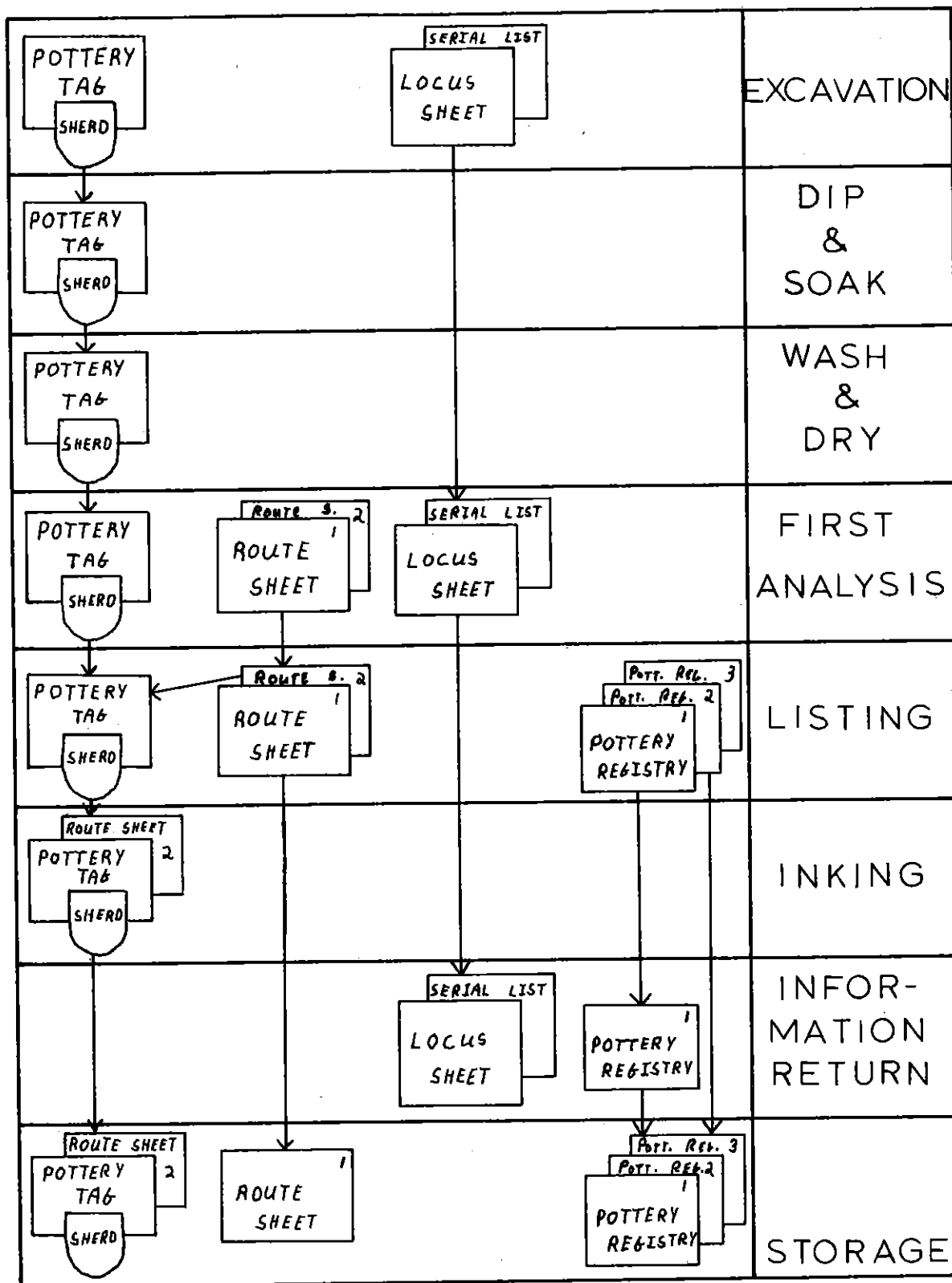


Fig. 28. Flow chart for the pottery registration process

the wealth of information concerning culture and chronology that pottery can yield, great care must be taken at each step in the registration process to avoid losing, misrecording, breaking, or mixing the sherds or the information from the various pottery containers.

*Excavation* - In the excavation portion of the pottery registration process, four separate steps occur. First, the area supervisor assigns one or more pottery containers each day for each locus being excavated. Each container is entered on the pottery container serial list with its proper number, the locus, and the date (see fig. 18). Second, the area supervisor records the pottery container number on the proper locus sheet (see figs. 14, 16). Third, the pottery container tag is prepared; the site, season, date, supervisor's initials, field, area, locus, pottery container number, and brief description of the locus are placed on the tag (see fig. 19). At this point the actual excavation begins.

It is during the excavation process that contamination is most likely to occur. Carelessness in pottery handling or inadvertent excavation into a new locus can cause contamination. If contamination takes place or if reconstructable vessels are encountered, this should be noted on the pottery container tag, the locus sheet, and the pottery container serial list. At the completion and closing of a pottery container, the number of baskets of earth removed while the container was in use should be entered on the pottery container tag and on the locus sheet. The closed container should then be transferred from the area being excavated to the field storage space for transportation to the field laboratory.

*Dipping* - At the conclusion of a working shift, all pottery containers are taken to the field laboratory for the dipping process. The sherds from a given container are individually dipped in water from a pail and carefully examined for writing, paint, and slips. If writing, paint, or a slip is observed on any sherds, they are placed in a separate container and allowed to dry. Sherds with no writing, paint, or slip are dropped into the water-filled pail to soak. The pottery container tag is switched to the water-filled pail that now contains the sherds, and the container with the separated sherds is attached to the handle of the pail. Care must be taken to keep the correct tag with each pail and to attach the separate container securely to the pail's handle. The dipping process is one of the simplest and most tedious tasks on the dig, but it should never be performed in a perfunctory fashion since it is the only way to preserve traces of paint or writing on sherds from the destructive effects of ordinary soaking and washing.

*Soaking* - After dipping, the water-filled pottery pail is removed to the location designated for the storage of pottery containers in the soaking stage. During the 24 hours of soaking, containers should be kept well away from places people walk through.

*Washing and Drying* - Washing is also performed in a controlled and careful manner in order to minimize the possibility of mixing sherds. First, the soaking water is drained off and the sherds from a single

pail are placed in a large, shallow tub filled with fresh water. Sherds are individually scrubbed with a nylon bristle brush, rinsed, and placed in a drying bag made of mosquito netting or similar mesh. The container of non-washed sherds, which were separated in the dipping process, is also placed in the drying bag. The bag is then tied shut and the pottery container tag is attached to its handle. When filled and tagged, the bag is hung by its handles on a rack to dry in the sun and wind.

*First Analysis (Pottery Reading and Recording)* - After about 24 hours of drying, the bags are taken to the pottery reading table. The pottery reading is attended by four people: the ceramic expert, the field supervisor, the area supervisor, and a volunteer from the area who acts as a clerical assistant. The field supervisor and the area supervisor are present to identify and describe the locus from which the pottery comes and to record the results of the first analysis. This has two objectives: to provide preliminary dating evidence for the locus and to identify indicator sherds and other important sherds that will be retained for further analysis.

The pottery drying bag is opened, and its contents are emptied onto the pottery table. All the sherds are examined, and the indicator sherds (and other important sherds) are segregated. The remaining sherds are discarded, except when reconstruction is possible and all sherds are saved. The selected sherds are numbered sequentially in pencil, beginning with "1" for each new bag. The number is usually written on the back of the sherd. Next, the sherds are entered by number on the route sheet (see fig. 29). Field, area, "bucket" (pottery container) number, and locus number are copied from the pottery container tag. "Field No." is the penciled number from the back of the sherd. "R," "D," "C," and "NA" can be checked to indicate that special operations are to be performed on the sherd. "R" means that the sherd should be registered. This occurs for almost all sherds that reach this stage. "D" means that the sherd should be drawn, and "C" that its attributes should be coded for numeric storage in a computer bank. These two steps are usually reserved for sherds of special interest or for those relating to the most recent phase apparent in the locus and consequently of particular significance for dating purposes. In other words, drawing and coding are performed for stratigraphic reasons. "NA" indicates neutron activation, a nuclear process whereby the analyst tries to learn the location of the clay deposit from which the clay originated. This is an expensive process that involves the study of trace elements in the clay and is usually reserved for representative imported wares. "Remarks" should record the conclusions of the ceramic expert on the vessel type represented by the sherd and on its period of manufacture. Two period designations separated by a hyphen (e.g., Pers-Iron 2) mean that the sherd is a transitional form found in both periods. Two period designations separated by a slash (e.g., Pers/Iron 2) mean that the ceramic expert is not sure to which period the sherd belongs. A period designation followed by a question mark indicates a probable date for the sherd. If the vessel type is unknown, "UK" is entered; if the period is undetermined, "UD" is entered. The date of

REG. NO. 28/6/77	FIELD	AREA	BUCKET	LOCUS	FIELD NO.	R	D	C	NA	REMARKS
3053	I	61	23	040.1	1	✓	✓	✓	✓	5th Cent Grady Krater
3054					2	✓	✓	✓		Persian Bowl Rim
3055					3	✓	✓	✓		Persian Bowl Rim
3056					4	✓	✓	✓		Persian Bowl Rim
3057					5	✓	✓	✓		Persian Mott. Rim
3058					6	✓	✓	✓		Persian Jar Rim
3059					7	✓				Persian U.K. Rim
3060					8	✓				Persian U.K. Rim
3061					9	✓				Persian(?) Bowl Rim
3062					10	✓	✓	✓		Persian Base
3063					11	✓				Persian Base
3064					12	✓				UD Handle
3065					13	✓				UD Handle
3066					14	✓				EB Bowl Rim
3067					15	✓				EB Hole mouth Jar Rim

Fig. 29. Pottery route sheet

excavation is noted directly under "Reg. No.". This leaves only the actual registry numbers blank. These will be filled in later by the pottery registrar. Two copies of the route sheet are made and placed with the indicator sherds and the pottery container tag in a plastic bag which is then sent to the pottery registrar after the completion of the first analysis.

Two other recording processes are also performed during the first analysis. For each pottery container, the area supervisor enters the periods determined at the preliminary analysis on the locus sheet opposite the proper pottery pail number. If one period predominates, an asterisk (\*) is placed next to that period. The same information is entered on the pottery container serial list. Secondly, the ceramic expert keeps a master pottery book. This book contains a listing of all pottery containers examined, the periods present, and a description of all loci. A separate master pottery book is kept for each field. Each book is organized by area, and the pottery containers are listed sequentially for each area. Under each container number the ceramic expert enters the field, area, locus number, date excavated, brief description of the locus, and periods represented by the pottery. The same conventional abbreviations used on the routing sheets are employed in the master pottery books. These books provide a means of correcting errors or ambiguities on the route sheets, pottery registry, or locus sheets.

*Pottery Registry: Listing* - Two steps are involved in the actual process of registration: listing and inking. The listing is based on a continuous sequence of numbers starting at "1" for the first sherd registered in the initial season of excavation. At the pottery registration table the pottery bag is opened, and the two copies of the route sheet are removed. The next X numbers of the pottery registry are given to the X number of sherds in the bag. These numbers are entered individually on the route sheets in the blank spaces under "Reg. No.". One copy of the route sheet is replaced in the bag of sherds, and the bag is sent to the inking process.

Utilizing the other copy of the route sheet, the registrar enters the information in the pottery registry. The pottery registry (see fig. 30) contains the pottery inventory of the excavation. Below "Reg. Nos." the sequence of numbers for the pottery container at hand is entered. Then the field, area, locus, pottery container number, and date are copied from the route sheet. The "Field Call" is a listing of all periods represented on the route sheet. "Remarks" indicates the special treatments (drawing, coding, and neutron activation) for each sherd on which they are to be performed. The pottery registry is made in triplicate. One copy is used by the area supervisors to retrieve information, another is for the archives of the expedition, and the third is turned over to the Department of Antiquities at the conclusion of the excavation season.

When the listing is complete, the route sheet, the archival copy of the pottery registry, and the copy for the Department of Antiquities are sent to storage.

POTTERY REGISTRY

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REG. NOS.	FIELD	AREA	LOCUS	BUCKET	DATE	FIELD CALL	REMARKS
3037 - 3052	I	61	040.1	22	28/6	Persian, Iron I MB, EB, UD	Draw - 3037-3042, 3051 Code - 3037-3042 NA - 3041
3053 - 3079	I	61	040.1	23	28/6	Persian, EB, UD	Draw - 3053-3058, 3062, 3072-3 Code - 3053-3058, 3062, 3073 NA - 3053, 3073
3080 - 3113	VI	1	137	34	28/6	Gaza, EB, UD	Draw - 3080-3089, 3099 Code - 3080-3089, 3099
3114 - 3121	I	3	289	23	28/6	LB, MB, EB, UD	Draw - 3114-6 Code - 3114-6
3122 - 3169	VI	3	087	29	29/6	EB, UD	Draw - 3122-48 Code - 3122-48
3170 - 3203	VI	41	004	8	29/6	Gaza, EB, UD	Draw - 3170-3 Code - 3170-3
3204 - 3225	I	3	290	24	29/6	LB, EB, UD	Draw - 3204-15 Code - 3204-15 NA - 3206
3226 - 3230	VI	1	139	36	29/6	Gaza, EB, UD	CONTAMINATED

Fig. 30. A page from the pottery registry



*Pottery Registry: Inking* - The sherds, pottery container tag, and remaining copy of the route sheet are placed on the inking table, where the sherds are laid out in numerical order, according to the numbers penciled on them at the first analysis. The site, season, field, area, locus, and registry number corresponding to that penciled number on the route sheet are neatly printed in India ink on the inside of the sherd at an inconspicuous location, and the penciled number is erased from the sherd. When all sherds of a particular pottery container are inked and dry, the sherds, route sheet, and pottery container tag are rebagged and sent to storage.

*Return of Information* - The area supervisors' copy of the pottery registry is used by each area supervisor to complete the individual pottery container entry on the locus sheet (see figs. 14, 16). The area supervisor locates the registry numbers for his or her area in this copy of the pottery registry and places them next to the proper pottery container numbers on the locus sheet.

*Storage, Shipment, Drawing, Coding, and Neutron Activation* - These functions are all related to the post-dig study of the excavated material and, as such, are not examined in this manual. While still at the site, the director of the expedition should decide which materials are to be stored and which should be shipped to various locations for drawing, coding, neutron activation, or further study.

*Material Culture Registry (cf. Bennett, Bennett 1976: 97-101)*

The material culture registry (MCR) is the central record for all artifactual material and everything else resulting from human occupation except sherds, but including ceramic objects. The collection of material culture evidence in the field is the responsibility of the area supervisor (see pp. 64-66). Since the character of this evidence will vary from site to site, the area supervisors will be instructed by the specialists, the senior archaeologist, and the field supervisors concerning the evidence that can (and should) be gathered and the proper method of its collection in the field. Once the sample is collected, many of the same procedures that occur in pottery registration are followed. A flow chart of the steps in the MCR process is presented in fig. 31. Again, the primary responsibility for careful excavation and recording of the material culture evidence rests with the area supervisors.

*Excavation* - Four separate steps in the MCR process occur at the excavation stage. They are almost identical to those carried out in the pottery registration process. First, samples are collected during the excavation of a locus and placed, depending on the character and size of the sample, in an appropriate bag, box, or pail. Once the sample has been isolated, the area's material culture serial list (see fig. 20) is consulted to obtain the next field MC number for the particular area. This number, the associated pottery container number (the number of the pottery container currently open in the locus), the locus number, the

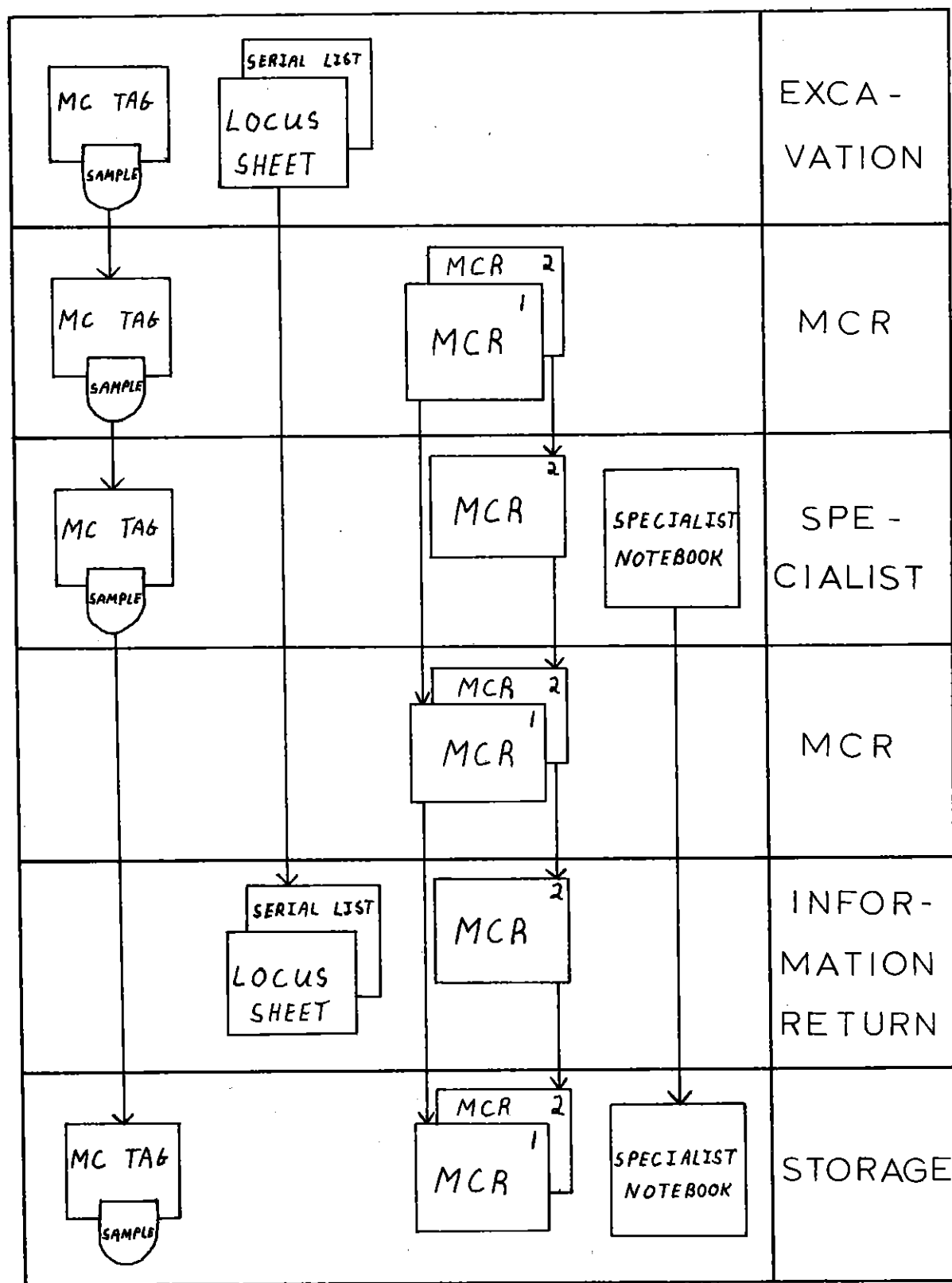


Fig. 31. Flow chart for the material culture registration process, excluding the object registry sub-process

date, and the specialist to whom the sample will be sent are entered on the area's material culture serial list. Then the field MC number, the associated pottery container number, and the specialist to whom the sample is being sent are recorded on the locus sheet (see. figs. 14, 16). Its remaining columns are left blank for recording the analysis of the specimen at a later time. The final step in the field is the preparation of the MC tag (see fig. 21) which records the site, season, date, supervisor's initials, field MC number, and description of the sample (including where it was found). The tag is secured to the container of the sample, and both are removed to the field laboratory at the end of the work shift and deposited in the box labeled with the name of the appropriate specialist. Certain samples may be extremely fragile, delicate, or important. These should be taken to the field laboratory as soon as they are excavated and receive priority attention.

Implements or other artifacts made of bone or chert are sent from the field to the MCR as objects to be sent to the object registry (see pp. 100-103), not as bone or lithic samples.

*Registration: Initial* - The material culture registrar removes the samples from the boxes and registers them. The MCR (fig. 32), like the pottery registry, is organized on a continuous sequence of numbers, starting at "1" for the first sample gathered during the initial season of excavation. The registrar assigns the next sequential MCR number to that sample and enters it both on the field tag and in the column headed "Reg. No." in the material culture registry. This number becomes the master identifying number. The registrar completes the next six columns in the MCR from the information contained on the field MC tag. The last of these columns, headed "Specialist," records to whom the sample is sent. The following abbreviations have been accepted for use in this column: "Bot." for botanical remains both from flotation and field-gathered samples, "Geol." for stone or geological samples, "Lithics" for knapped cherts, "Mal." for shell (including snails), "Ar." for objects or other artifacts, and "Osteo." for human and animal bones.

The original and one copy of this registry are produced by the registrar. The copy of the MCR is a carbon copy of its first seven columns only. The information on this copy is to be located on the upper part of a 5 inch x 3 inch file card, one for each registry number. This file-card copy becomes the working copy of the registry. The first stage of the registration process is now complete, and the registrar sends the sample, the field MC tag (with the MCR number added), and the file card to the appropriate specialist or, if the artifact was created by human hands, to the object registry (see below, pp. 100-103). At this point all columns in the MCR right of the column headed "Specialist" are blank.

*Specialist* - Each sample examined by a specialist receives a specialist's number. This number is the means by which the sample is identified in the specialist's notebook, and represents his or her own system of recording the analyses. The specialist's notebook will contain, not only the field analysis, but eventually also the results of

MATERIAL CULTURE REGISTER

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Reg. No.	Field	Area	Locus	Field No.	Date	Specialist	Analysis	Spec. No.	Dispo.
1802	VI	1	137	83	28/6	Osteo.	3 Human teeth, human long bones	146	Save
1803	I	61	040.1	67	28/6	Bot.	See Flot. Registry	-----	---
1804	VI	1	137	84	28/6	Bot.	See Flot. Registry	-----	---
1805	VI	1	137	78	28/6	Lithics	Chert wadi pebble with natural break	160	Disc.
1806	I	3	289	56	28/6	Lithics	3 Cores, 16 Flakes, 4 secondary	161	Save
1807	I	61	040.1	68	28/6	Ar.	Chert Blade	63	Save
1808	VI	1	137	81	28/6	Ar.	Glass Bracelet	64	Save
1809	I	3	280	60	28/6	Mal.	6 Fresh water snails	80	Save
1810	I	3	289	57	28/6	Mal.	1 Clam shell	81	Save
1811	VI	41	003	9	28/6	Osteo.	1 Complete human burial	147	Save
1812	VI	41	003	10	28/6	Ar.	Copper ring from burial	65	Save
1813	VI	1	140	85	28/6	Lithics	1 core, 8 flakes, 1 secondary	159	Save

Fig. 32. A page from the material culture registry

more detailed study of the material after the specialist has left the field. In relation to the material culture registry the specialist performs four operations:

1. The specialist assigns the specialist's number and enters it both on the field tag and on the file-card copy of the registry.
2. A detailed, though not exhaustive, analytical study is performed on the sample, and the results are entered in the specialist's notebook and on the file-card copy of the registry.
3. The disposition of the sample is determined. If it warrants further study or ought to be preserved for the record, it will be saved. If not, it will be discarded. A record of the disposition is entered in the specialist's notebook and on the file-card copy of the registry.
4. The final on-site duty of the specialist is to return the completed file-card copy to the MC registrar.

*Registration: Continued* - From the entries made by the specialist on the file-card copy of the registry, the registrar records the information in the columns headed "Analysis," "Spec. No.," and "Dispo." in the original MCR. This entry in the MCR is now complete.

*Information Return* - Each area supervisor is provided a file box for the return of MC information. After the MCR entry is complete, the MC registrar places the file cards arranged in numerical order by the field MC numbers in the appropriate area's box. The field MC numbers are used rather than the MCR numbers since this simplifies the area supervisor's task of returning the data to the locus sheets. The area supervisor transfers the specialist's number, the MCR number, and the analysis of each sample to the appropriate column on his or her locus sheets (figs. 14, 16).

The file cards have now served their purpose and may be discarded. As a precautionary measure, however, they are retained until the next excavation season.

*Storage, Shipment, and Study* - The post-excavation activities of storage, shipment, and study are again not the focus of this manual. The director of the expedition should make careful plans at the site for shipment and subsequent study, so that the material may be quickly and efficiently distributed to those responsible for its further examination and eventual publication.

This completes the normal sequence of in-field processing of material culture items. Deviations from the standard do exist. Objects and flotation samples receive special treatment, and samples which raise problems of identification are temporarily diverted from the system pending initial analysis.

*Object Registry* - Objects, those artifacts that were created or shaped by human hands, are not sent directly to a specialist for study, but leave the normal flow when they first reach the MCR (see fig. 31). The MC registrar assigns each object a number in the regular MCR sequence, fills out the first seven columns of the MCR, at the same time making the file-card copy, and passes the object together with its field tag and file card to the object registrar, who initiates the special process of object registration (see fig. 33). Fig. 34 shows an object registry card. As in the other registries, the cards for the object registry should be numbered sequentially beginning with "1" for the first object of the initial season. Since the need to do this was not recognized at Hesi until the 1973 season, the object registries for 1970, 1971, and 1973 all begin with "1" and duplicate the numerical sequence. The numbering in the object registry for 1975 (and later) continues sequentially from the numbering begun in 1973. Each object registry card is produced in an original and two carbon copies. The original is given to the Department of Antiquities of the host country. One copy is placed in the expedition's archives. The second copy circulates among those engaged in post-dig research. The object registrar:

1. Enters the object registry number on the field tag and on the file card copy of the MC registry.
2. Enters the object registry number, MCR number, year, date found, field, area, locus number, field MC number, and number of the associated pottery container on all three copies of the object registry card.
3. Makes the measurements that may be necessary or desirable and enters the results on the three copies of the card. In case of doubt as to what measurements should be taken, the object registrar consults the project director.
4. Enters a brief description of the object on the three copies of the registry card. In order to prepare this description a preliminary cleaning may be necessary, but this is kept to a minimum and carried out only by methods known to be safe. If a conservator is on the staff, he or she will advise and assist in the cleaning process. For technical questions involved in the description one or more of the specialists will be consulted.
5. Fills out the remaining three columns on the file-card copy of the MCR and returns it to the MC registrar.
6. Passes the object on to the photographer who photographs the object and then sends it, along with its field MC tag, to storage.
7. Receives three black-and-white contact prints from the photographer along with the photograph numbers for both the black-and-white and color photographs. The object registrar then enters the photograph numbers on the three copies of the object registry card and attaches a contact print to each copy.

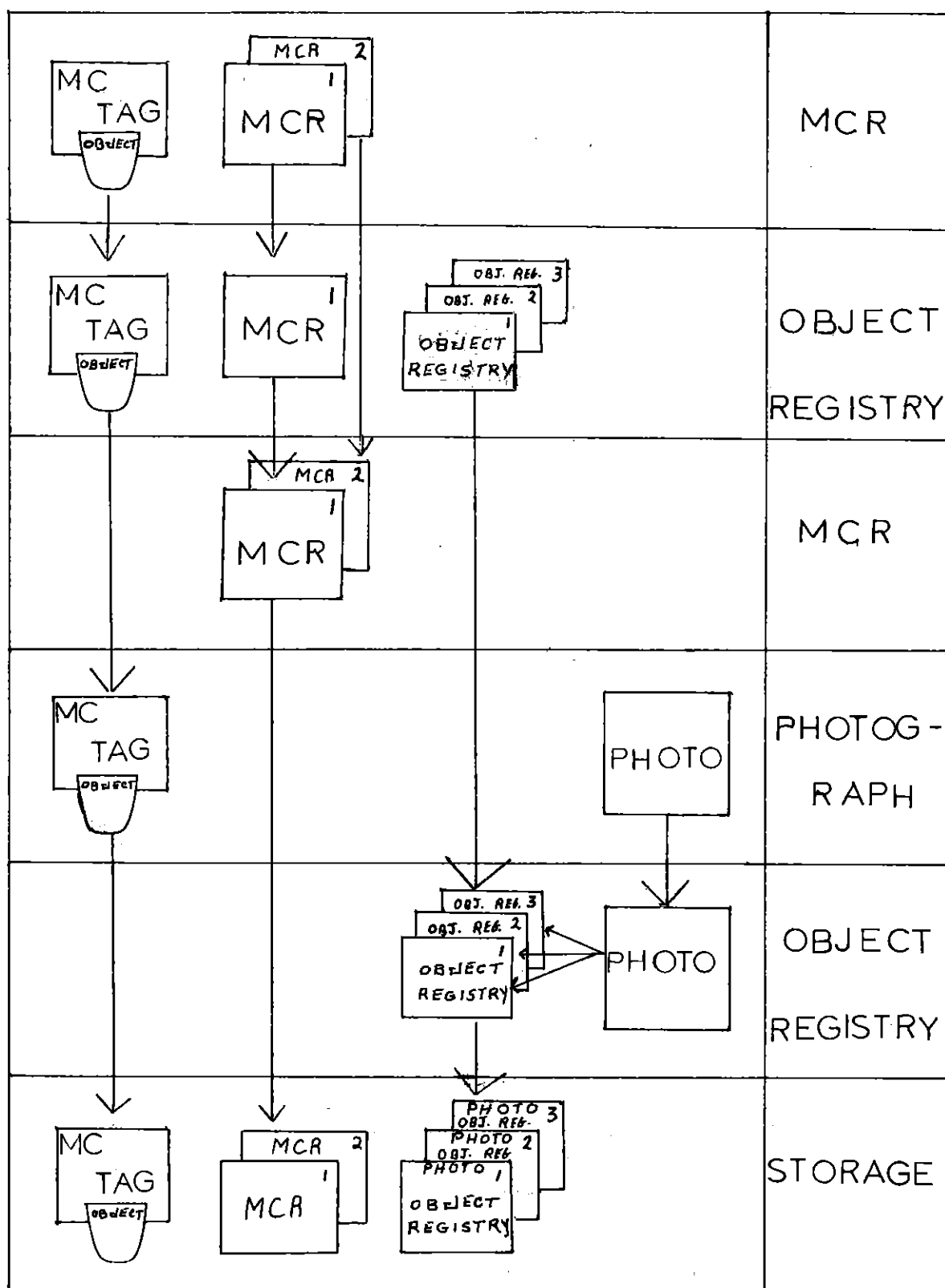


Fig. 33. Flow chart for the object registration sub-process

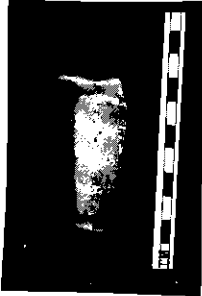
Objects Reg. No. 63		MC Reg. No. 1807		Hesi 1977	
Date Found 28-6-77 Field I Area 61 Locus No. 040.1 Field MC No. 68 Measurements 6.5 cm. long, 1.5 cm thick 2-3 cm. wide Description <i>Broken Chert Blade;          Right edge denticulate          Left edge retouch;          Proximal retouch;          Patinated          Associated Pottery #23          Pers., EB, UD</i>		Photo No. 319 		b/w(✓) color(✓)	
Phase III-B		Comments			

Fig. 34. Object registry card



8. Obtains the pottery analysis for the associated pottery container(s) from the area supervisor or pottery registrar and enters it on the three copies of the object registry card.

9. If the director of the expedition decides to have the object drawn, the object registrar obtains three Xerox copies or tracings of the drawing and attaches one to each copy of the card. The original drawings are kept in the archival file.

10. Later when the stratigraphic analysis is complete, the phase to which the object is assigned is recorded on the cards.

*Flotation* - The second anomaly in the MCR process is the registration of flotation samples. Each basket of earth submitted to flotation receives one field MC number. The flotation process, however, produces two samples; the light fraction (F), which floated to the surface, and the heavy fraction (G), which was captured on the mesh (see p. 25). To complicate matters further, a single specimen of heavy fraction may contain small bones, chert or other lithic fragments, shell, significant rock fragments, small artifacts such as beads, and tiny pieces of pottery. Each requires a different routing in the MCR process.

The method used through the 1977 season was to send the soil sample to be floated to the MC registrar, who assigned it an MCR number in the regular sequence, filled out the first seven columns of the MC registry, and wrote the MCR number on the field tag. The sample was then sent to the flotation tank for processing. The F and G fractions were returned to the MC registrar in two separate canvas bags, each with a duplicate tag. The F (light) fraction then went to the botanist for analysis, and retained the MCR number originally assigned. The G (heavy) fraction went initially to the geologist, usually the one to whom most of the material contained in the G fraction pertains. The geologist carefully sorted the sample and separated its contents into categories. These materials went back to the MC registrar for the assignment of a new MC number and a duplicate of the original field tag to each item. The items were then distributed to the appropriate specialist(s) and handled as discrete MCR items.

The recording system just described conserved all the data, but scattered the data derived from a single flotation sample throughout the MCR. It could be recombined, but only at the expense of the time lost in a long search. To meet this difficulty an elaborate system of cross-referencing in red ink was necessary.

In order to simplify the rather unwieldy system of registering the data from flotation, a special flotation analysis form (fig. 35) was devised during the 1977 season and first used in 1979. The flow chart



to illustrate the use of this form is shown in fig. 36. This form provides space for the combined analysis of a given flotation sample by all the specialists involved, but under a single MCR number. An original and two carbon copies of this form are made, one for the MCR, one for the area supervisor, and one for the coordinator of the field laboratory (in Hesi's case, the project director). As before, when a flotation sample is excavated a field MC tag is filled out. Then the sample and its tag are sent to the MC registrar, and the following "new" sequence is initiated (see fig. 36):

1. The MC registrar assigns the next sequential MCR number to the sample and enters the words "see flotation registry" after the MCR number in the MCR. (Note: no carbon copy of the MCR is made for flotation samples since the "Flotation Analysis Form" takes the place of the second copy.)

2. The MC registrar fills out the year and first six columns of the "Flotation Analysis Form" (see fig. 35) and places it, along with its two carbon copies, in a box entitled "Incomplete Flotation Analysis Forms."

3. The MC registrar writes the MCR number on the MC tag and sends it and the sample to the flotation tank,

4. The sample undergoes flotation. The botanist retains the F fraction for his or her study and sends the G fraction, along with a duplicate MC tag, to the geologist.

5. The geologist separates the various individual samples from the G fraction and sends these samples, along with duplicate tags, to the other specialists.

6. As each specialist completes his or her analysis on the sample, he or she records that information in his or her specialist notebook under the appropriate specialist number. In that entry the MCR number is noted.

7. After analysis each specialist goes to the box of incomplete flotation analysis forms and fills in the sections on the form that are applicable to his or her analysis.

8. When all sections of the flotation analysis form for which there were samples are complete, the MC registrar pulls the completed flotation analysis form from the box and divides the copies among the MCR, the area supervisor, and the coordinator of the field laboratory. The original copy belongs to the MCR and is placed at the back of the MCR.

Pottery fragments recovered from the wet sieving are usually too tiny to be of use, but they are bagged and sent with a duplicate field MC tag to the pottery reading table for a regular first analysis (pp. 91-93). If any are to be saved, a route sheet (fig. 29) is filled out,

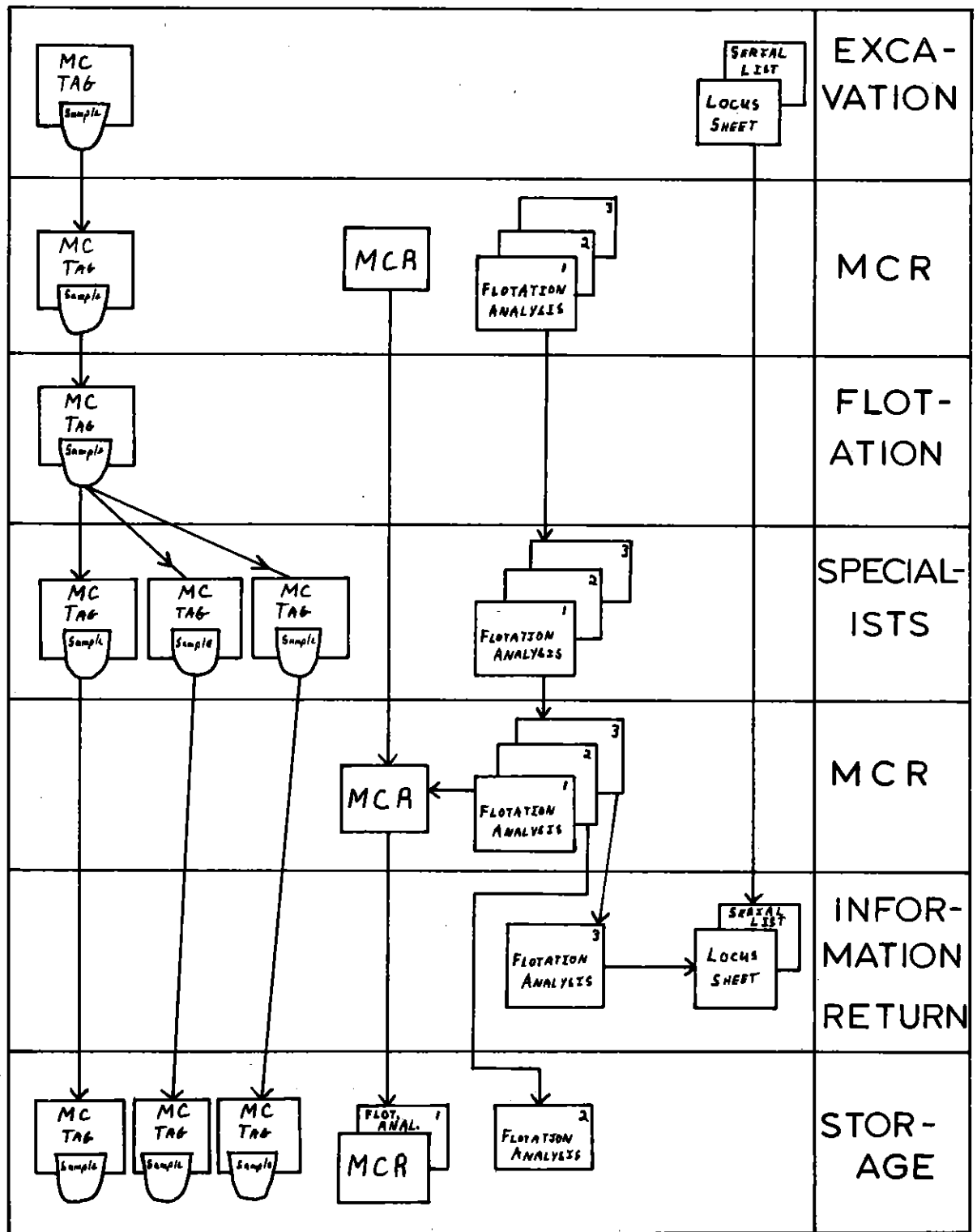


Fig. 36. Flow chart for flotation registry process

and the bag, route sheet, and tag are sent to the pottery registrar for the normal registry and inking procedures (pp. 93-95). They are then bagged with the other sherds from the same locus.

*Triple Registration* - Whole vessels, ostraca, or sherds with special characteristics (such as potter's marks, figured decoration, and the like) are recorded in all three registries: pottery, material culture, and object. As a general rule, any piece of pottery which is worth photographing in the field laboratory receives triple registration. The process of triple registration is cumbersome, but essential. Fortunately, it is required of very few items. Since researchers may use any of the three registries as the primary tool in recovering the data for study, all three must alert the researcher to the presence of these important objects and indicate where the full data may be found in the registries.

The special nature of items that are to be triply registered is detected either in the field or during the dipping, washing, and reading of pottery. While the routing for each is different, the registration process is similar. If the item is detected in the field, it is:

1. Sent to the MC registrar where it is registered as a normal MC sample. A field MC tag and a pottery container tag must accompany the object to the MC registrar.
2. Sent to the pottery reading table where the ceramic expert examines it in context with the associated sherds. On the "Route Sheet" (fig. 29) it is registered as a normal ceramic piece, but with the notation "Object" under "Remarks".
3. Sent through the regular pottery registration process (see. fig. 28).
4. Sent to the object registry. Here the normal sequence is fully followed (see fig. 33). In the end the sample is stored with the objects.

If the item is detected in the process of dipping, washing, or reading of pottery, it is:

1. Examined and recorded during pottery reading by the ceramic expert. Again, the word "Object" is placed under "Remarks" for the sherd.
2. Sent to the MC registrar, along with a field MC tag. The MC registrar enters the object into the MCR.
3. Sent to the pottery registrar for the rest of the pottery registration process.
4. Sent to the object registry. Here the normal sequence is followed, and in the end the object is stored with the other objects.

Each registrar must be sure to retrieve all of the data required to complete the record from the other registrars.

*Problem MC Samples* - Problem samples are those whose identification is uncertain and whose proper assignment for specialist study is difficult. In such cases the sample is sent to the geologist, who functions as problem solver. The geologist consults with the other specialists until the identification is clear. The sample is then returned to the normal processing chain. If no decision can be reached, the MC registrar enters "problem" in the column headed "specialist," and deposits the sample in a special box for post-dig study.

## CHAPTER EIGHT: SPECIALISTS

The past few decades have seen the expansion of archaeology from a rather narrow discipline in which one person could dominate an entire dig to an integrated multidisciplinary science. During these decades archaeology has increasingly become a cooperative enterprise involving the contributions of field archaeologists, photographers, geologists, osteologists, cultural anthropologists, botanists, physicists, and chemists. As a result, archaeological expeditions are now increasingly characterized by a team approach.

This manual does not attempt to describe the work of the scientific specialists in the same detail as that of the field personnel. Each scientific specialist employs the techniques and principles proper to his or her own discipline, and to attempt to set them forth in however cursory a fashion would involve a long discussion that would be out of place in this handbook. In the preceding pages the way in which specialists' analyses are integrated into the expedition's recording system has been discussed. Integration at the recording level, however, does not solve the larger problem of the interaction between the excavators and their scientific colleagues in the excavation and publication phases of the expedition. The problem may be stated in a negative way. How can the work of the excavators and of the scientific specialists be prevented from following parallel lines which do not meet or engage one another? More positively, the problem is to develop a creative dialogue between the field staff and their scientific colleagues which will result in a unified publication rather than one in which the work of the specialists is relegated to a series of detached appendices. The end result should be as full and multi-faceted an understanding of the culture and the environment of the site and region as possible.

In an effective interaction directed towards this goal the specialists and the excavators educate each other. The excavators learn the possibilities and limitations of each type of analysis, what kind of data is required to carry it out, and how that data must be gathered to make it available to the specialists in its most complete and useful form. Conversely, the scientific specialists learn the methodological framework in which the excavators' work and the data-gathering procedures possible within it. Within the limits of the expedition's overall goals, the specialists' observations and suggestions should be permitted to influence the strategy of the excavation. For example, the requirements of botanical analysis may require that a particular technique be employed in the excavation of a pit, or the observations of the geologist may indicate where the most promising field for the investigation of a specific archaeological problem should be laid out.

From its inception the Joint Expedition has pursued the goal of developing a truly interdisciplinary project along the lines indicated above. The manual can provide no simple rules by which all the complexities of interdisciplinary research can be resolved. In each season of the Joint Expedition's work, however, new implications of the

integrative process have been explored, and substantial progress has been made toward the overall goal. The director of the expedition has taken on the role of coordinator for the field and scientific aspects of the dig. He conducts regular conferences with the specialists individually and as a group concerning the progress of their work and on its significance for the interpretation of the site. He organizes weekly field tours in which the specialists discuss problems with the excavators and offer their suggestions in the context of the excavation process itself. The specialists make daily visits to the areas under excavation both to follow the progress of the field work and to be available for consultation with the field and area supervisors. The specialists are also accessible to the field personnel for conferences in the field laboratory. At the end of each digging season all the specialists present to the director reports of their work. The director sees to it that these findings are integrated into the preliminary report of the season. The preliminary reports thus become a means of experimenting with the methods of integration to be used in the final report.

In an ideal situation all relevant specialists would be on hand at the site so that their expertise would be immediately available to help solve various archaeological problems. Unfortunately, in most cases the cost of having a large number of specialists and the provision of enough work for each to do renders the ideal situation impractical. In more pragmatic terms, specialists can be grouped into three classes: those who take part in the field work on a full-time basis, those whose full time need not be spent in the field, and those whose presence at the site is not required. Depending on the character of any given site, almost any particular specialist could be required in the field on a full-time basis. Figure 37 illustrates the most likely grouping of specialists for a site such as Tell el-Hesi.

The description "part-time," applied to the second group of specialists, may be misleading. It should not be taken to imply that their work is less central or important to the expedition than that of the "full-time" specialists. In practice the term simply means that the part-time specialists are dividing their time as appropriate between the field and the laboratory. Indeed, it is this division of time which makes possible an interplay between specialists' analyses and field strategy with a minimum of delay. In general, the same observations are valid for the off-site specialists, although the input of their work into the overall planning of the excavation is not as immediate as that of the full-time or part-time specialists.

One of the on-site duties of the specialist is direct supervision of volunteers. Each day volunteers, on a rotating basis, are assigned to assist the individual specialists. This allows the volunteers to learn the specifics of certain specialist duties and allows the specialist to have assistance in the analytical process. In the evening educational program, lectures for the volunteers by the specialists explain their work and its relationship to the archaeological enterprise. Field trips are also led by certain specialists in order to educate the volunteers on the local environment, both past and present.



<b>FULL TIME</b>	SURVEYOR/ARCHITECT PHOTOGRAPHER CERAMIC EXPERT
<b>PART TIME</b>	GEOLOGIST OSTEOLOGIST BOTANIST LITHIC SPECIALIST CERAMIST
<b>OFF SITE</b>	MALACOLOGIST EPIGRAPHER NUMISMATIST ARCHITECTURAL SPEC. GLASS SPECIALIST OTHERS

Fig. 37. Specialists grouped in terms of most probable field demand

*Full Time Staff in the Field*

*Surveyor/Architect* - The surveyor/architect is the only specialist whose sole responsibility is in the field, and is also one of three specialists whose presence is required at the site on a full-time basis (see fig. 37). Depending on the size of the site and the intensity of excavation, it may be necessary to divide the two functions.

The surveying function includes laying out fields and areas, mapping the site, and reading key elevations or datum elevations for others on the field staff, especially the area supervisors. Demands on the surveying function will occur almost daily. Priorities among the many demands for survey work are organized and determined by the field supervisors and the senior archaeologist before they are presented to the surveyor/architect.

The architect function relates to the drawing of the official plans for the expedition. These activities and their timing, coordinated by the senior archaeologist, involve drawing finished sections and, more importantly, drawing buildings and other features for publication. The form and scale of these plans will be determined by the senior archaeologist and the director of the expedition since they relate to the publication phase of the expedition.

*Photographer* - The photographer has the responsibility for photographs in the field, for photographs in the field laboratory, and for general publicity shots. In the field the photographer is called upon to take both publication shots and record shots. Publication shots are photographs of particularly important features, balks, areas, or fields that will be published in the expedition's preliminary and final reports or in articles. These photographs are the adjunct of sections and top plans; they receive the photographer's highest priority and are taken with great care. They should be taken at a time when there is proper lighting, when the object of the photograph is perfectly clean, and when there are no obtrusive features in the focus or background of the picture. Record shots are photographs of important features and are the second highest priority of the photographer. They should be taken with as much care as possible, since these photographs may also be used in publication. Both publication and record shots are the products of consultation and co-operation between the photographer and the area or field supervisor. The area or field supervisor tells the photographer what is important in the desired photograph and what should be included. Once the content has been determined, the photographer sets up the photograph using his or her professional knowledge in order to meet the desired specifications. The field supervisor then should look through the camera's view-finder to assure himself or herself that the photograph will satisfy the needs.

In the field laboratory the photographer is called upon to photograph all objects and representative samples of materials received as material culture evidence. These photographs may also be published

and should be taken with care to show the object in the best possible way and against a consistent and not distracting background. The photographer should remember that the aim of the photograph is not just an artistic representation of the artifact, but a visual report of its principal characteristics. After photography it is essential for the photographer to return the objects photographed to storage, lest the objects be lost.

Publicity shots are not photographs of the excavation as such, and they do not necessarily record any archaeological material. They are photographs of life, activities, and people on an archaeological dig, and are used as promotion for the dig and for the institutions that sponsor it. These shots are the lowest priority of the photographer, but are still necessary for the expedition. The organization of the photographer's time and the priorities for all photographs are decisions of the director of the expedition and the senior archaeologist.

All photographs, with the possible exception of publicity shots, are taken both in black-and-white and in color. This serves two purposes: it is a hedge against the loss of any unique photograph through errors in the developing process, and it recognizes the fact that different aspects of a shot may be highlighted differently in black-and-white than in color. The black-and-white film should be developed as soon as possible. Initially three 3 inch by 5 inch prints of field photographs are made, one each for the area supervisor, field supervisor, and director. Three copies of object photographs are also produced, one for each copy of the object registry card. Inspection of these black-and-white prints may catch errors in the photographs and allow for the retaking of the shot before the subject is removed and lost forever.

A scale marked in metric units should be placed in all photographs except publicity shots, and scales of 1.00 m, 0.50 m, 0.10 m, 0.05 m, 0.02 m, 0.01 m, and 0.005 m should be available. The first two scales are used in field photographs. The smaller scales are employed in object photography, and can be referred to as 10 cm, 5 cm, 2 cm, 10 mm, and 5 mm scales. All scales are divided into suitable sub-units which are distinguishable by painting them alternately black and white or red and white. At the end of the scale the unit employed is indicated with sufficient clarity to appear distinctly in the photograph. The scale should be placed close to the principal subject and parallel to the opposite edges of the photograph. Occasionally two scales of different lengths are desirable. They should be positioned according to the principles just given. North should be indicated in the photograph by a suitable convention. Metal arrows of several sizes, painted in a variety of colors for use against different backgrounds, are convenient for this purpose.

Lighting in the Near East can be very tricky and difficult to work with. As a general rule early morning hours (5:00-6:30) or late afternoon hours (4:30-6:00) provide the best light, since the intense light of mid-day produces harsh shadows and washed-out colors. As an aid during the mid-day hours, however, a shade cloth can be used to

reduce the intensity of light and the amount of contrast. Even when a picture is taken during the best of conditions it is advisable to bracket the shot as a hedge against deceptive lighting. Instead of taking just one black-and-white and one color photograph of each subject, a series of photographs should be taken, at the f-stop indicated by the light meter and at an appropriate f-stop both above and below the indicated f-stop depending on the type of film in the camera.

A final and very important aspect of the job of the photographer is the recording of information concerning each photograph. Two methods are used jointly. First, a card containing both the location and the contents of each photograph is filled out (see fig. 38) and photographed as the exposure immediately preceding that photograph. Second, the photographer keeps a serial list of photographs. This master list, which is kept in a lined notebook, records the information found on the cards. The key feature of this system is the photograph number. This is a unique number in a series beginning with "1" for the first photograph taken during the first year of excavation. Each photograph is assigned the next sequential number (the same number for black-and-white and for color). This number is placed on the card (fig. 38) and in the master list of photographs. Any time a picture is printed or discussed its number is affixed to the print or used to

Photo No.	<u>423</u>	Initial	<u>W. N.</u>
Field	<u>I</u>	Supervisor	<u>J. A. B.</u>
Area	<u>61</u>	Supervisor	<u>F. H.</u>
Locus	<u>017, 018, 035, 037, 016</u>		
View	<u>towards North</u>		
Camera Format		Date	<u>1 July</u>
Subject Description	<u>MORTAR AND STONE</u>		
	<u>BUILDING WITH ITS ASSOCIATED INSIDE</u>		
	<u>FLOOR.</u>		

Fig. 38. Photograph recording card

designate the photograph. The photograph number is given to the area supervisor who places it on the locus sheet and on the photograph list for each area (see figs. 15 and 22). (Note: This photographic numbering system was not begun at Hesi until 1977, and the photographic record of the Expedition for previous seasons actually contains a variety of systems.)

*Ceramic Expert* - This specialist position is traditionally held by one or more of the senior staff members, but this is by no means necessary. The ceramic expert knows the history and typology of pottery, can date the sherds, and can form some judgment as to their place of origin and use. The ceramic expert is responsible for the first analysis of the pottery (pp. 91-93) and therefore makes preliminary decisions as to its subsequent treatment and disposal.

#### *Part-Time Staff in the Field*

*General Recording Duties* - Even though specialists may be working in greatly divergent fields, they do work within the same recording system. In Chapter 7, "The Field Laboratory," the material culture registration process was presented and the recording responsibilities of the specialists were seen as they related to that process. In addition to the MCR, each specialist keeps a separate record of more detailed observations on the samples studied. The nature of this comprehensive record varies from specialist to specialist. At the end of the season each specialist submits a detailed report of activities and findings to the director in a suitable form. The preparation of this report is the final on-site duty of the specialist.

*Geologist* - The geologist should perform three functions for an archaeological expedition. First, he or she should determine the geologic history of the site. This includes a determination of the local rocks, soils, and clays, a study of the water supply available to the site, and a general explanation of its physical appearance. The second function is to assist in the field description of loci. The geologist can help to determine what a soil layer is made of, how it was deposited, and possibly why it was deposited. The third function is the identification of geologic and other samples gathered in the various areas. This function applies not only to rocks and mud bricks, but also to objects made of stone or metal, and includes identification of what the sample is made of, where it came from, and how it has been processed to arrive at its present form. The identification of non-local stone or other materials can be of great importance in understanding the trade routes of different periods as they relate to the site.

*Osteologist* - The osteologist is required to examine two types of bone remains, human and animal. It may be advantageous, however, to divide these two tasks in a large expedition or on a site where a cemetery is being excavated. Animal bones will be encountered in the excavation of most loci. They can be examined for species, age, sex, disease, and evidence of cooking or butchering. Human remains may be found in the same contexts as animal bone or in the context of a

cemetery. The variety of information which can be derived from the study of human bone is indicated in the discussion of the burial code (see pp. 48, 55-59). To this may be added the incidence of certain diseases which leave their mark on bones. This information, gathered from the study of human and animal bone, can be used to help understand the history and culture of the site as it changes over time.

*Botanist* - Botanical samples are gathered in three different ways. The first method is the field collection of samples from the areas under excavation. Charcoals, for example, are typically recovered in this way. The second method of collection is flotation. This process, which was discussed on page 25, is under the supervision of the botanist. The botanical remains recovered by flotation are mainly seeds. The third method is the gathering of pollen samples in which the botanist and his or her assistants do actual collecting. The work of the botanist is essential to the study of culture, since it provides information on crops grown and plants eaten by the populace, as well as on vegetation of the surrounding area and climate of the region during various periods.

*Lithic Specialist* - Chert (flint) implements, the raw material from which they were made, and the debitage from their manufacture are the main interest of the lithic expert. These concerns include the source of raw material, the method and place of manufacture of the implement, the technique of its manufacture, and the use to which it was put. In cooperation with the geologist, the lithicist also studies implements and utensils made of other types of stone. These results, combined with those of other specialists, are essential ingredients in the formation of a complete picture of the area's culture, period-by-period, and of its trade connections with other areas.

*Ceramist* - The ceramist, who is usually a working potter, examines samples of pottery found on the site to determine the technique by which the clay was prepared, the method by which the vessel was formed, and the details of its firing. In this study the ceramist will often mix the clay for a particular type of vessel and reproduce the ancient form on the wheel. The expertise of the ceramist frequently aids the geologist in the location of clay beds in the vicinity of the site. Also pottery restoration is attempted for selected loci where restorable pots are likely to be present. Little in the way of daily reporting is required of the ceramist, but a final report which describes the activities and conclusions of the season's work should be submitted to the director.

#### *Specialists Not Required in the Field*

Specialists in this category are engaged in the intensive study of a single type of archaeological evidence, or of a type of evidence rarely encountered on the site. It is desirable that these specialists visit the excavation several times during the season, so that they may see at first hand the contexts from which their material is derived. They may also be called to the site for special consultation if they are physically available.

*Malacologist* - A malacologist is an expert in the study of molluscs, whose primary function in the laboratory of the expedition is to study and report on the snail shells recovered. These are usually land or fresh-water snails, but marine molluscs may be encountered as well, and the malacologist can offer an expert opinion on marine bivalves. The most useful samples of land and fresh-water snails are obtained from flotation, since the smaller species are more responsive to climatic changes. The malacologist can also provide information as to the shell's place of origin, whether the animal was used as an article of diet, and whether the shell was used for ornamentation. The final report of the malacologist catalogues the species found and their frequency of occurrence, examines changes in species from period to period, and discusses any climatological or other inferences which can be drawn from these changes.

*Epigrapher* - One of the most valuable forms of archaeological evidence for historical reconstruction is written material such as ostraca, inscribed clay tablets, and documents written on papyrus or leather. The epigrapher studies these for date, language, style, and content. Since the discovery of written material in Palestine is rare, the epigrapher is not normally on the site.

*Numismatist* - For levels in which they are found, coins give valuable evidence for dating and for the study of communication patterns and trade. The cleaning and study of coins requires laboratory and library facilities not available in the field. After minimal preliminary cleaning coins are sent to a numismatist for professional study.

*Glass Specialist* - The glass specialist does basically the same job as the numismatist for any glass objects recovered in the field. The raw materials used, the methods of production, the function, and the date of the glass objects are studied and reported upon.

### *Conclusion*

This chapter has attempted to show the variety of specialists that may function on a dig or in the post-dig research and publication phases. The list is by no means complete. Every expedition, and indeed each season of a particular excavation, may call for the services of a different set of specialists: chemists, physicists, dendrochronologists, computer scientists, architectural specialists, artists, art historians, textile specialists, hydrologists, or engineers. From an archaeological point of view, the main problems are to decide what specialists are to be consulted and how their work is to be integrated into the strategy, interpretation, and publication program of the expedition. Such decisions are made by the director of the expedition in consultation with the senior staff and the Publication Committee.

## APPENDIX ONE: GLOSSARY

This glossary of archaeological terms includes both ordinary terms used with a specific meaning in the manual, and technical terms not in common usage in English for which a definition is useful.

*Administrative Director* - The administrative director is an assistant to the director of the expedition whose field duties are coordination and control over the expenditure of funds (see Appendix Three).

*Area* - An area is a subdivision of a field. Its size depends on the function which it is designed to serve. In clearance operations area sizes can vary widely, in order that areas may be kept in a meaningful relationship to the structures being cleared. Areas are laid out as rectangles, because this simplifies the topographic relationships among areas, and, unless there are compelling reasons to the contrary, as six-meter squares. Areas are designated by Arabic numbers; thus Area 1 or just 1 (see fig. 3).

*Area Supervisor* - An area supervisor is responsible for one area. This person is responsible for the planning and execution of the day-to-day operations in the area and the recording of all evidence gathered there.

*Balk* - A balk is a strip of unexcavated earth, usually one meter wide, that separates areas within a field. A balk is made up of the outer 0.50 meter strip of each edge of each area (see fig. 4).

*Bracketing* - Bracketing is a photographic hedge against deceptive lighting. Instead of taking just one photograph of each subject, a series of photographs should be taken, at the f-stop indicated by the light meter, and at settings above and below the indicated f-stop that are appropriate for the type of film in the camera.

*Burial Code Form* - The burial code form is a recording device that stores skeletal and burial information in numeric form.

*Camp Manager* - The camp manager is responsible for all of the physical attributes of the camp. This includes its construction and demolition, food, supplies, equipment, sanitary devices, hired help, transportation, and the general welfare of the camp as a whole (see Appendix Three).

*Ceramic Expert* - The ceramic expert is the person, usually a member of the archaeological staff, who conducts the first analysis of the pottery as it comes from the field.

*Ceramist* - The ceramist is a professional potter who studies the ancient pottery and attempts to reproduce its fabric and form in his or her own workshop.



*Datum* - A datum is a point of known absolute elevation from which measurements are taken.

*Datum Line* - A datum line is a line strung between two datum points of equal elevation. If kept taut, it is absolutely horizontal.

*Dendrochronology* - Dendrochronology is an absolute dating technique based on the study of growth rings in trees.

*Director of the Expedition* - The director of the expedition is the highest administrative officer of an archaeological expedition. This person initiates and implements policy decisions, and promotes the smooth and efficient running of the expedition.

*Epigrapher* - The epigrapher is an expert in ancient language and writing who studies the inscriptional material uncovered during the excavation. For the purposes of this manual the functions of Linguist, Palaeographer, and Epigrapher have been combined under the last term.

*Feature* - A feature is a major coherent element of the ancient site, such as a room, a courtyard, a pit, or an industrial installation. A feature may be confined to one area, may extend to several areas, or may encompass an entire field. Features are by their nature field concerns, and their identification and numbering are the responsibility of the field supervisors. Features are identified on plans by an area and locus number enclosed in a circle and accompanied by a descriptive word, e.g., (61.093)-room, and in prose by the descriptive word followed by the area and locus numbers, e.g., Room (61.093). The area and locus numbers chosen as feature numbers should indicate either where the feature was first seen or where the feature is best seen.

*Field* - A field is the largest unit of excavation and consists of a group of closely related, usually contiguous, areas. Fields are numbered with Roman numerals in the order in which they are opened, e.g., Field I, or simply I.

*Field Laboratory* - The field laboratory houses the first stages of the analytical process of artifactual data. Here two steps are performed, cataloging and preliminary analysis.

*Field Supervisor* - A field supervisor is responsible for the overall operation of a field. This person determines the strategy to be followed in the field as a whole, and then counsels the area supervisors on methods to be employed to implement that strategy. A field supervisor will typically supervise a field containing four to seven active areas.

*Final Report* - Final reports are required of area supervisors, field supervisors, and specialists. These reports are comprehensive syntheses of all activities that were supervised by the individual.

*First Analysis* - First analysis, or pottery reading, is the first stage in pottery analysis. Here a tentative date for the sherds is assigned, and sherds are selected for further study.

*Flotation* - Flotation is a method of wet sieving. Here earth is placed in a container and immersed in water. Pure soil passes through the sieve and is discarded. All artifacts are caught on a screen, and all botanical elements float to the top and are saved.

*Foundation Trench* - A foundation trench is the excavation made in antiquity for laying in the foundation of a wall or other installation. The latest pottery in the foundation trench should represent the founding date of the structure.

*Goufa* - A goufa (gufa, goufah, or gufah) is a basket for carrying earth made of old tire casings.

*Khirbet* - Khirbet is the Arabic word for the ruin of an ancient settlement.

*Layer* - This term does not enter into the recording procedure, but is so frequently used that a definition is desirable. It is reserved for expanses of soil distinguishable from one another by color, texture, or content. In the normal process of recording, a layer will receive a locus number.

*Level* - 1) A level is an absolute elevation above or below sea level that is determined by the surveyor/architect.

2) The term level is often used to designate an occupational phase. If the word is used in this sense it must be clearly understood that it does not imply that the occupational phase in question is physically level.

*Locus* - Locus is the term employed for any layer or feature which appears in an area. Examples of loci are soil layers, walls, surfaces, or pits. Locus numbers are given to three decimal places (starting with .001) and are attached to field and area numbers. Thus, I.61.093 means Field I, Area 61, locus 093. The recording of observations by locus numbers is the basic device by which an area supervisor keeps an orderly area notebook. It must be added that most loci are real structural or architectural features, but that artificial loci also exist. A common type of artificial locus is a probe. Probes are dug to try to solve problems of stratigraphic relationships and hence do not correspond to any single physical or structural feature of the area.

*Locus Sheet* - Locus sheets record all observations required for any locus. Each locus in each area has a locus sheet on which all physical evidence and relationships with other loci are recorded. Locus sheets are filed in the area supervisor's notebook.

*Locus Summary Sheet* - Locus summary sheets are brief summaries of the data for each locus. They assist quick retrieval of information during the reporting and publication phases of the expedition.

*Malacologist* - A malacologist is a biologist whose specialty is the study of molluscs and mollusc remains.

*Make-up Layer* - A make-up layer is a layer of soil, sand, cobbles, or clay that is placed directly under a flooring layer by the builders of a structure. The purpose of a make-up layer may be for leveling or drainage.

*Material Culture* - Material culture (MC) is the collective term for the material other than pottery collected by the archaeological excavation, on the basis of which the culture of the site at various periods may be reconstructed.

*Material Culture Registry* - The Material Culture Registry (MCR) is the central collecting point of all non-pottery and non-stratigraphic information. It serves as a catalogue for the evidence and lists preliminary analytical results.

*MC Tag* - An MC tag, filled out in the area, identifies each MC sample and accompanies it through the MC registration process. A record of the information contained on the MC tag is retained in the area both on the locus sheet and on the MC Serial List.

*Munsell Color* - A Munsell Color is an objective color designation by which soil colors can be described. These standard colors and designations come from the *Munsell Soil Color Charts*, published by the Munsell Soil Company (1954).

*Numismatist* - The numismatist is an expert in ancient coinage who examines, cleans, identifies, and reports on coins recovered in the excavation.

*Object Registry* - The object registry is a sub-registry under the MCR. It is used for all artifacts which were created or shaped by human activity.

*Patish* - A patish (pattish) is a small hand-pick that is used for the loosening of soil layers. This instrument has two heads, a pointed one and one shaped as a blade.

*Period* - Period designations employed in Palestinian archaeology have been worked out on the basis of pottery chronology as the composite result of many excavations, and all excavators should be familiar with the main outlines of the system (see Appendix 2). These period divisions may correspond to the strata and phases at any particular site, but such correspondence is neither inevitable nor automatic. The coordination between the stratigraphy of the site and the

ceramic chronology of the region is a major subject of post-dig study.

*Phase* - 1) The term phase is used to designate constructional or occupational levels during excavation and subsequent study, up to the point where stratum numbers can be assigned. Thus EB, phase 1, EB, phase 2, etc. may be employed until the EB stratification and its relationship to the earlier and later strata are determined.

2) Phase is also used for a subdivision of a stratum distinguished by a minor or local disturbance in the structural or cultural continuity significant enough to require designation, but not significant enough to justify assignment of a new stratum. The term sub-stratum is also used as a synonym. Phases are designated by lower case alphabetic characters beginning with "a" for each stratum. Thus Vb would mean Stratum V, Phase b, or the second phase of Stratum V.

*Phase Plan* - Phase plans, which may be produced for an area, a field, or for the site as a whole, refer to a specific point in ancient time and show all contemporary walls, surfaces, and other architectural features of a given occupational phase. A phase plan is thus a map of all or part of the excavation at a point in historical time.

*Pottery Container Tag* - A pottery container tag is the tag, prepared in the area, that accompanies and identifies a pottery container through the pottery registration process. The original tag remains with the sherds during the storage and study phases. A record of the pottery container tag is retained on the locus sheet.

*Pottery Reading* - See First Analysis.

*Pottery Registry* - The pottery registry is the depository of all ceramic information. It serves as a catalogue, as a record of the preliminary analytical results, and as a guide for future processing of the material.

*Preliminary Report* - This report, which is prepared by the senior archaeologist and the director of the expedition, is a summary report of the results of a single season of excavation. It gives a general presentation of field results, suitably illustrated, but with a minimum of interpretation.

*Probe* - See Trial Trench.

*Route Sheet* - A route sheet is prepared during the first analysis for the registered sherds from each pottery container. It lists the analytical process to be carried out on each registered sherd, as well as the field identification of the date and functional class for each registered sherd.

*Sealed Locus* - A sealed locus is a locus for which there is demonstrable stratigraphic evidence that all later material is excluded and that the locus represents a deposit which resulted from one activity during a single occupation phase.

*Section* - A section is a scale drawing (usually 1:25) of a balk. A section shows every occupational phase and every soil layer visible in the balk face. Since the section cuts every plan at right angles, it provides a visible record of the vertical relationship of the plans to each other.

*Senior Archaeologist* - The senior archaeologist is the member of the archaeological staff who, in consultation with other staff members, is responsible for the overall strategy, methods, tactics, and final synthesis of archaeological results for the expedition.

*Serial Lists* - The area supervisor keeps sequential lists of all pottery containers and material culture samples gathered in the area. These lists begin with "1" for the first container or sample of the season, and give a summary of the source and content of each container or sample.

*Specialists* - A specialist is a member of the archaeological team who is highly trained in another discipline or skill. This person brings expertise to the expedition that can be applied in a special way to aid archaeological analysis. Examples of specialists are botanists, biologists, numismatists, artists, photographers, geologists, ceramists, and epigraphers (see Chapter Eight).

*Stratigraphy* - Stratigraphy is the arrangement of rock or soil layers and the resultant study of their origin, the order of their deposition, and their functional and chronological relationships to one another.

*Stratum* - Stratum is an inclusive term for a series of layers which, taken together, represent a continuous period of occupation during which there were no major structural or cultural discontinuities. A stratum is usually marked at its beginning and end by radical changes in stratigraphy such as, for example, destruction layers which involve the whole site. Strata are designated by Roman numerals assigned in order from the most recent stratum encountered, e.g., Stratum I, Strata IV-V.

*Structure* - A structure is a group of features which, taken together, form a major architectural unit of the field in one of its phases, such as a house, a cemetery, a road, or a water system. Structures are identified on plans by a structure number enclosed in a circle and accompanied by a descriptive word, e.g., ④-house, and in prose by the descriptive word followed by the structure number, e.g., House ④. Structure numbers are assigned by the field supervisor in sequential order for that field. Loci are grouped as features and features are grouped as structures.

*Structure Sheet* - A structure sheet organizes the field supervisor's observations and interpretations of a structure and its component parts.

*Subsidiary Balk* - A subsidiary balk is a temporary balk produced in order to connect an isolated feature in the interior of an area to one of the main balks. Subsidiary balks are necessary for reporting and must be drawn.

*Surveyor/Architect* - The surveyor/architect is a specialist whose duty is to lay out fields and areas, provide datum points, and prepare plans for final publication.

*Technical Man* - A technical man is a professional excavator. He is usually hired from the local population and has acquired superior excavation skills through numerous seasons spent excavating archaeological sites.

*Tell* - A tell is a mound composed of the remains of human occupation. It was created by the successive building and destruction of occupational levels.

*Top Plan* - Top plans show the progress of the excavation. They are maps of what is exposed in the excavated area at a point in modern time during the excavation (e.g., on a particular day of the excavation season).

*Trial Trench* - A trial trench or probe is a small portion of an area that is excavated when uncertainty exists as to sequencing. The purpose is to dig from the exposed surface to the next clearly defined layer in order to gain control of the stratigraphy.

*Triangulation* - Triangulation is a surveying technique designed to locate unknown points in relation to two or more known points. The distance to an unknown point is measured from two known points. This describes two arcs around the known points. Their point of intersection within the area is the location of the unknown point.

*Volunteers* - Volunteers form the workforce of the expedition. All are students or people interested in archaeology. They are more than dirt carriers; they are archaeologists in training; they learn archaeological method and theory, and often receive academic credit for their work.

## APPENDIX TWO: NEAR EASTERN PERIOD TERMINOLOGY

Lower Paleolithic ..... ca. 300,000 BC to ca. 70,000 BC  
Middle Paleolithic ..... ca. 70,000 BC to ca. 35,000 BC  
Upper Paleolithic ..... ca. 35,000 BC to ca. 12,000 BC  
Mesolithic ..... ca. 12,000 BC to ca. 10,000 BC  
Neolithic ..... ca. 10,000 BC to ca. 4000 BC  
Chalcolithic ..... ca. 4000 BC to ca. 3200 BC

Early Bronze Age (see below) ..... ca. 3200 BC to ca. 2100 BC  
    Early Bronze I ..... ca. 3200 BC to ca. 2900 BC  
    Early Bronze II .... ca. 2900 BC to ca. 2650 BC  
    Early Bronze III ... ca. 2650 BC to ca. 2350 BC  
    Early Bronze IV .... ca. 2350 BC to ca. 2100 BC

Middle Bronze Age ..... ca. 2100 BC to ca. 1550 BC  
    Middle Bronze I .... ca. 2100 BC to ca. 1950 BC  
    Middle Bronze II ... ca. 1950 BC to ca. 1550 BC

Late Bronze Age ..... ca. 1550 BC to ca. 1200 BC  
    Late Bronze I ..... ca. 1550 BC to ca. 1400 BC  
    Late Bronze II ..... ca. 1400 BC to ca. 1200 BC

Iron Age ..... ca. 1200 BC to 586 BC  
    Iron I ..... ca. 1200 BC to ca. 900 BC  
    Iron II ..... ca. 900 BC to 586 BC

(Brief period of Babylonian domination .. 586 BC to 537 BC)

Persian Period ..... 537 BC to 332 BC  
Hellenistic Period ..... 332 BC to 63 BC  
Roman Period ..... 63 BC to AD 324  
Byzantine Period ..... AD 324 to AD 640  
Early Islamic Period ..... AD 630 to AD 1174  
Crusader Period ..... AD 1099 to AD 1291  
Late Islamic Period ..... AD 1174 to AD 1890  
Modern ..... AD 1890 to present

NOTE: There is a debate over the date for the end of the Early Bronze Age and the start of the Middle Bronze Age. The major issue is whether Early Bronze IV and Middle Bronze I should be merged, and if so, to what period does this combined period belong.

### APPENDIX THREE: THE ADMINISTRATIVE DIRECTOR AND THE CAMP MANAGER

#### *Administrative Director*

Although this manual deals primarily with field and laboratory procedures, the office of administrative director is so crucial to the successful functioning of any archaeological expedition that this position deserves a brief description. As the expedition's chief financial officer, the administrative director is a key member of the policy committee and of its executive (see fig. 39).

In the operations-management phase of the expedition (fig. 1) the administrative director prepares the preliminary budget for the proposed season. This is never a simple task. Appropriate budgetary accounts have to be worked out, covering every aspect of the expedition's fieldwork and its programs for post-dig study and publication. Budgetary appropriations must be made from the available funds in such a way as to reflect the expedition's objectives and guarantee their achievement. Since the response of funding agencies is rarely known in the planning stage of the expedition, one or more contingency budgets must be drawn up in case the funding assumed in the main budget does not materialize. The budget-making procedure of the Hesi Expedition involves four stages:

- 1) The executive of the policy committee meets to discuss the aims and strategies of the forthcoming season and the resources needed to meet them.
- 2) On the basis of this discussion the administrative director proposes one main operating budget along with contingency budgets in case assumed funding does not materialize.
- 3) The executive of the policy committee reviews these documents and
- 4) submits them to the full policy committee for review and approval.

The operating budget that they approve becomes the financial wind to which the expedition must trim its sails, and the administrative director the helmsman who makes sure that the ship sails as close to the wind as possible without capsizing. In subsequent planning sessions the administrative director has the last word, not in what will be done, but in what can be done financially.

During the operations-management stage the administrative director also works closely with the director of the expedition in shaping applications to funding agencies. He or she not only provides the financial information which the agencies require, but helps to spell out the implications of the budget in the text itself. In the operations-management, as in subsequent, phases the administrative director receives all funds designated for the expedition, and disburses them in accordance with expedition policy. As the time for entering the



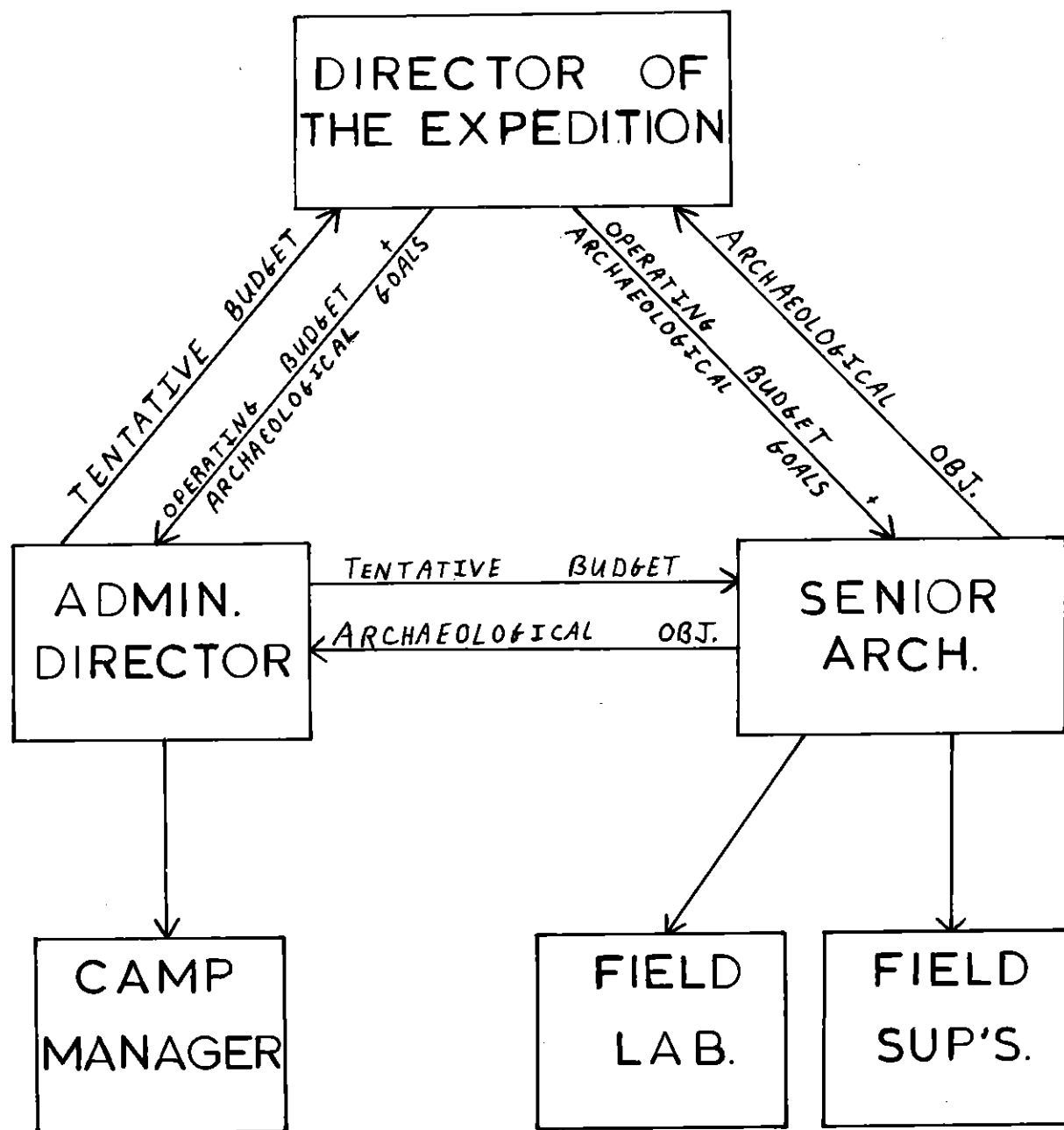


Fig. 39. The lines of responsibility of the field administration staff

field approaches, the administrative director decides what portion of the funds are to be transferred to the host country and in what form.

On the site during the excavation phase, the role of the administrative director changes to part watchdog, part bill-payer, part banker, and part supplier. Expenditures in the field require constant surveillance, and budgetary accounts must be adjusted almost daily as crises requiring unexpected expenditures arise. The watchdog function of the administrative director means that a large part of the working day is spent paying bills and tabulating receipts, so that the financial record of the expedition may be kept up to date. In authorizing expenditures and revising the budget, the administrative director works closely with the director of the expedition and the camp manager. The administrative director is also active in the negotiation of contracts with suppliers and repair men. In the discharge of these responsibilities the administrative director travels about a good deal and, therefore, frequently acts as liaison officer with agencies and companies whose headquarters are off the site.

In the post-dig phase, the administrative director dispenses funds for research and publication and supervises the administration of those funds in accord with the operating budget. No small part of this work involves the organization of conferences for the coordination of research and publication.

To discharge these many-sided responsibilities the administrative director must have more than financial expertise and business acumen. Training in archaeology and experience in the field are required, if the available resources are to be applied efficiently to fulfilling the archaeological goals of the expedition.

#### *Camp Manager*

The Joint Expedition to Tell el-Hesi operates a camp at a considerable distance from the nearest town. Consequently, everything necessary for maintaining a tent village with a population of over 120 persons must be provided. This task falls to the camp manager and assistants, in close cooperation with the director of the expedition and the administrative director.

The camp manager is responsible for setting up the camp, organizing its day-to-day operation, taking it down at the end of the season, and storing the equipment. Once set up and in operation, the camp includes five units: the living quarters, the kitchen and dining area, the camp workshop, the field laboratory, and the processing area for washing, drying, and reading pottery. For the living quarters the camp manager must provide electric power, sanitary toilet facilities, and a canteen where refreshments and personal supplies are available. He or she must supervise the assignment and maintenance of the tents, the laundering of the bed linen, and the enforcement of the daily schedule. The kitchen and dining area must be supplied with water, light, and refrigeration. Food must be provided and prepared under sanitary conditions. Menus

must be drawn up, meal rotations organized, the flies kept under reasonable control, and the kitchen staff kept reasonably happy. In the workshop, equipment is repaired and issued as needed from the general stores. During the camp setup the camp manager determines the most efficient lay-out for the field laboratory, and during the season provides its occupants with the equipment and supplies they need. In the processing area the camp manager must provide a water supply, washing tubs, drying racks, brushes, work tables, and equipment for bagging and storage. These are only a few of the many and often unexpected logistical problems with which the camp manager deals. The job requires a firsthand knowledge of the excavation process, joined with mechanical skill, versatility, adaptability, patience, and cheerfulness.

#### APPENDIX FOUR: ADDENDUM TO "BURIAL CODE FORM"

(Extracts from ch. 7, "Field Recording and Computer Coding," in *Tell el-Hesi: Modern Military Trenching and Muslim Cemetery in Field I (Strata I-II)*, by L. E. Toombs, ed. by K. G. O'Connell, S.J., Excavation Reports of the American Schools of Oriental Research: Tell el-Hesi 2, forthcoming.)

##### *Notes on Skeletal Data*

*Boxes 1-3.* The field data entries are required in case the burial sheet becomes separated from its locus sheet. Boxes 1-3 allow a stray sheet to be associated with its proper locus sheet, photographs, top plans, and material culture and object registries.

*Box 2.* The three-digit number applies easily to Field I, but the system of plot designation adopted for Fields V and VI in 1975 needed modification for expression as a three-digit number. Since only one plot was excavated in each field, and its 1-m x 1-m squares were given letter designations, the numeral "1" was omitted and the letter was translated into its numerical equivalent. Thus, V.1-d was recorded as 504, and V.1-p as 516. For all subsequent seasons, a numbering system similar to that of Field I has been adopted for Fields V and VI.

*Box 3.* The three-digit number is used in all cases (001 for locus 1; 010 for locus 10; 100 for locus 100).

*Box 4.* The entries distinguish grossly between human and animal remains. When the remains are human, the sex data may be included without confusion and without overburdening the entries. For identification of the animal(s) represented in animal remains, the locus sheet must be consulted. If mixtures of animal and human remains need to be recorded, further entries may be created.

*Box 5.* The age divisions were developed by the osteologist so as to reflect the changes which occur with the development of the skeletal structure. With advancing age these changes take place less rapidly and are less pronounced. Consequently the age span involved in each entry progressively increases, and only in rare cases can the age of an adult over 24 years of age be determined with greater precision. In these cases, the more precise data are entered on the locus sheet.

*Box 6.* Articulation is reported only in the positive or negative sense. This information is the minimum needed to allow a distinction to be made between disturbed and undisturbed or between primary and secondary burials. However, the form of the code used in the field does not report on partial skeletons, or tell whether such incompletely excavated or preserved remains are articulated or not. This has to be inferred by comparing box 6 under skeletal data with box 4 under grave data. The latter indicates cases where only part of the skeleton could be excavated.

*Boxes 7 and 8.* The entries include a miscellany of information: the position of the hand, the flexation of the wrist and elbow, the position of the arm in relation to the body. A full set of entries provides a fairly complete picture of the positions of both arms. However, double or triple entries in the same box are usually required.

*Boxes 9 and 10.* The entries descriptive of the legs are similarly comprehensive, but also require multiple entries in the same box.

*Box 11.* The strange order of the entries reflects the growth of the reporting system. In its 1971 form the entries gave only the cardinal points of the compass. In 1973 four more directions were added, and in 1975 the boxing of the compass was completed. In each season the additional directions were added to the end of the list, so that no conflict would develop with the sheets filled out in previous years. Ideally observations of eye direction should be made with the use of a compass, but this was not always done.

*Box 12.* Not all theoretically possible body positions are covered by the entries, but the list does include all the cases actually encountered in the cemetery. In fact, no skeletons flexed on the front (entry 5) were found. The main omission from the category is any device for expressing the degree of flexation. Observations on degree of flexation were entered directly on the locus sheets.

*Box 13.* Information on the general location of the burial in the square is of great assistance in relating the code sheet to the appropriate top plans, photographs and section drawings, and this is the chief reason for its presence in the code.

*Box 14.* The orientation of the skeleton is the direction of the body's axis, read from the head to the feet. Since the body may be assumed to have been placed in the grave with the spine relatively straight, the orientation can be adequately indicated by specifying the direction of the head in relation to the rest of the skeleton. The entries, therefore, consist merely of the points of the compass, read clockwise from north. Badly twisted skeletons, if any were encountered, would require a separate entry on the locus sheet.

#### *Notes on Grave Data*

*Boxes 1-3.* See "Notes on Skeletal Data"

*Box 4.* The awkward word "excavatability" indicates the purpose of the category - to show to what degree the burial was accessible to the excavators. If it was partially in the balk, entries 2 and 3 tell whether or not its main features could be distinguished with sufficient accuracy to be reported. Box 4 thus serves to explain the absence of data in other categories.

*Box 5.* These entries deal with multiple burials by giving the number of skeletons found in a common grave. Four is sufficient to deal with

any case actually found, but the numerical sequence could be extended indefinitely without altering the form of the code. In cases of multiple burial each skeleton must be given a sub-locus number and reported on a separate form for skeletal data.

*Box 6.* The vertical relationship of a grave to other burials appears primarily on the top plans, from which it is transferred to the general plan of the cemetery. It is also seen in the section drawings, if the grave intersects a balk. Box 6 gives an additional check on these recording devices, by alerting the student of the burial sheets to the fact that a case of superimposed graves is being dealt with. The form of the code used in the field provides for only three superimposed burials. The experience of the 1975 season demonstrated that this should be extended to four.

*Box 7.* Cist shapes are given in somewhat subjective terms, but the uniformity of the cemetery and the small number of grave shapes actually found make the general and rather vague descriptions adequate.

*Boxes 8-10.* The measurements, given in centimeters, never require more than three digits. The depth of the cist is the measurement from the top of the covering stones to the bottom of the cist. For uncapped graves the upper measurement is taken from the point at which the existence of the cist was recognized. Length and width measurements are maximum readings. All measurements should be examined in conjunction with those shown on the top plans, for which they serve as a valuable check. The absolute levels of the top and floor of the grave at several points appear on the locus sheets and top plans.

*Boxes 11 and 12.* The entries in these categories were developed on the basis of the type of covering and lining material found in 1970. There is no reason for the lists to differ in numbering and content of entries. The fact that they do so is a source of unnecessary confusion, introduced by inadvertence and perpetuated from a desire to keep the forms consistent from season to season.

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