

Charting In Situ Artifacts:

The Application of a Computer-Aided Software Programme

in the Archaeological Excavation

At Kota Tampan, Malaysia

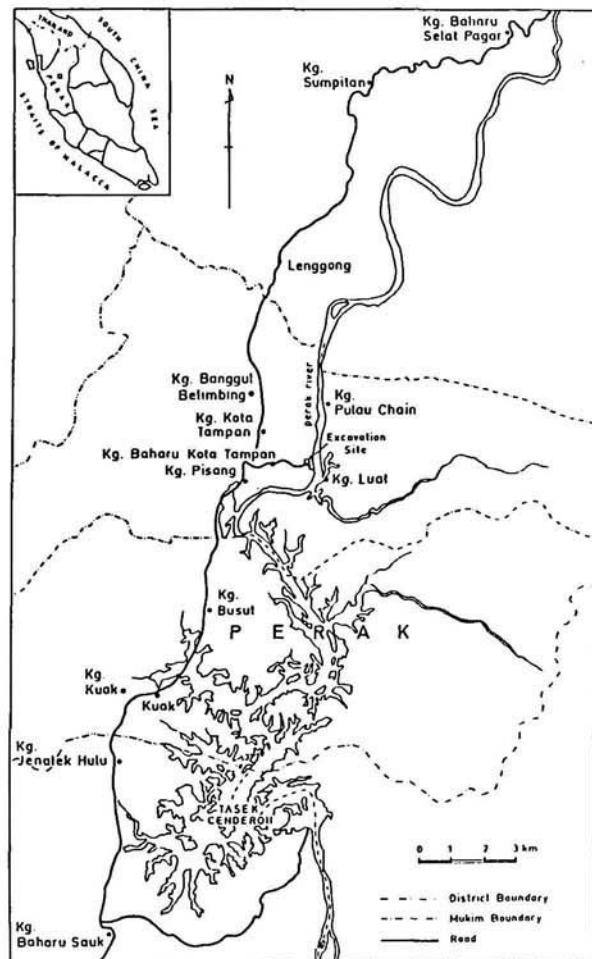
by Zuraina Majid

Introduction

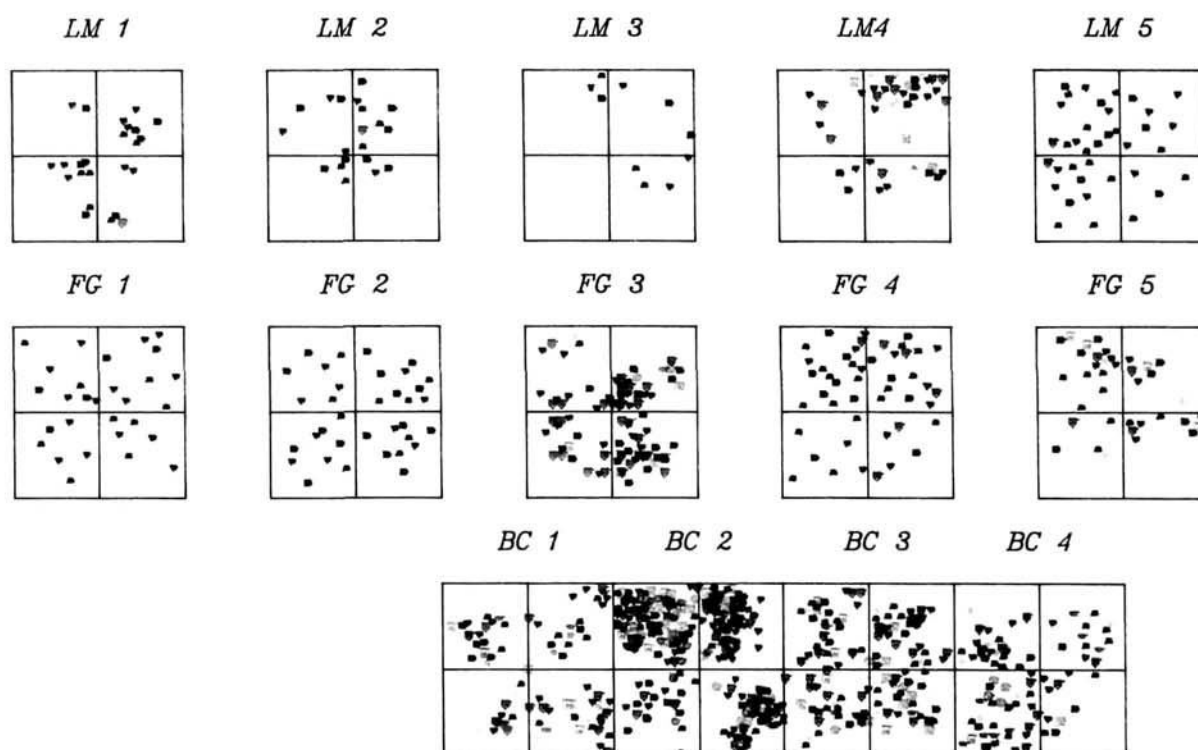
During the excavation of an archaeological site, two kinds of maps are required. The first is the topographic map outlining the location of the site in relation to establish reference points such as roads and other permanent features. The second type of map shows how the site surface is divided into trenches including the measuring and locating of artifacts.

For this second kind of map, it is necessary to establish the grid system, the datum point and the contour map of the site. It is necessary to do all these in order that all the artifacts recovered can be charted accurately and are, thus, retrievable for purposes of reconstruction and analysis, when the site is eventually excavated and "destroyed".

Accurate charting is also important. Because the essence of what is being analysed by the archaeologist consists of the organizational aspects of an entire cultural system with rare and bare clues. Archaeological data must therefore try to capture as many



A. Location of the Kota Tampan Site in Lenggong, Perak



B. Fig.1 Plan-Kota Tampan Palaeolithic Workshop.

of these attributes, such as distribution, relative size, number, vertical and spatial arrangement of artifacts. Spatial and quantitative relations are also of crucial importance.

Although archaeologists have detailed systems of making sure such measurements are recorded carefully and accurately, problems can arise, for instance, when the site is very large, or if the yield in artifacts is enormous. Although manual recording, when completed, can be transferred into computer lists for analysis, spatial and vertical arrangements are to be captured visually.

In the case of palaeolithic sites where because of age, the kind of site and the lack of evidence other than

lithic artifacts seem to survive, spatial patterning assumes greater significance. Viewing artifacts spatially and vertically, by trenches and from different angles, is in itself an important intermediate step in analysing the total collection holistically. It can also be used to test out whatever theories one may have about the clustering and distribution of the different artifact types.

An attempt was made to achieve these aims mentioned above. It was made through the application of AutoCADTM, a computer-aided graphic design programme to chart the approximately 40,000 artifacts. This included debitage recovered from a year-long excavation of a prehistoric stone tool workshop at

Kota Tampan, North Malaya (Fig. 1).

This article describes that attempt by describing the AutoCADTM programme and the equipment needed; by outlining the necessary steps to take, and then by attempting to evaluate the application for its strengths and weaknesses as well as by suggesting some further developments needed.

AutoCADTM

This is a drafting software programme that can run on a micro computer, under the MS-DOS (or the PC-DOS) operating system. It therefore requires an IBM or IBM-compatible personal computer. Preferably it should be an AT (80286

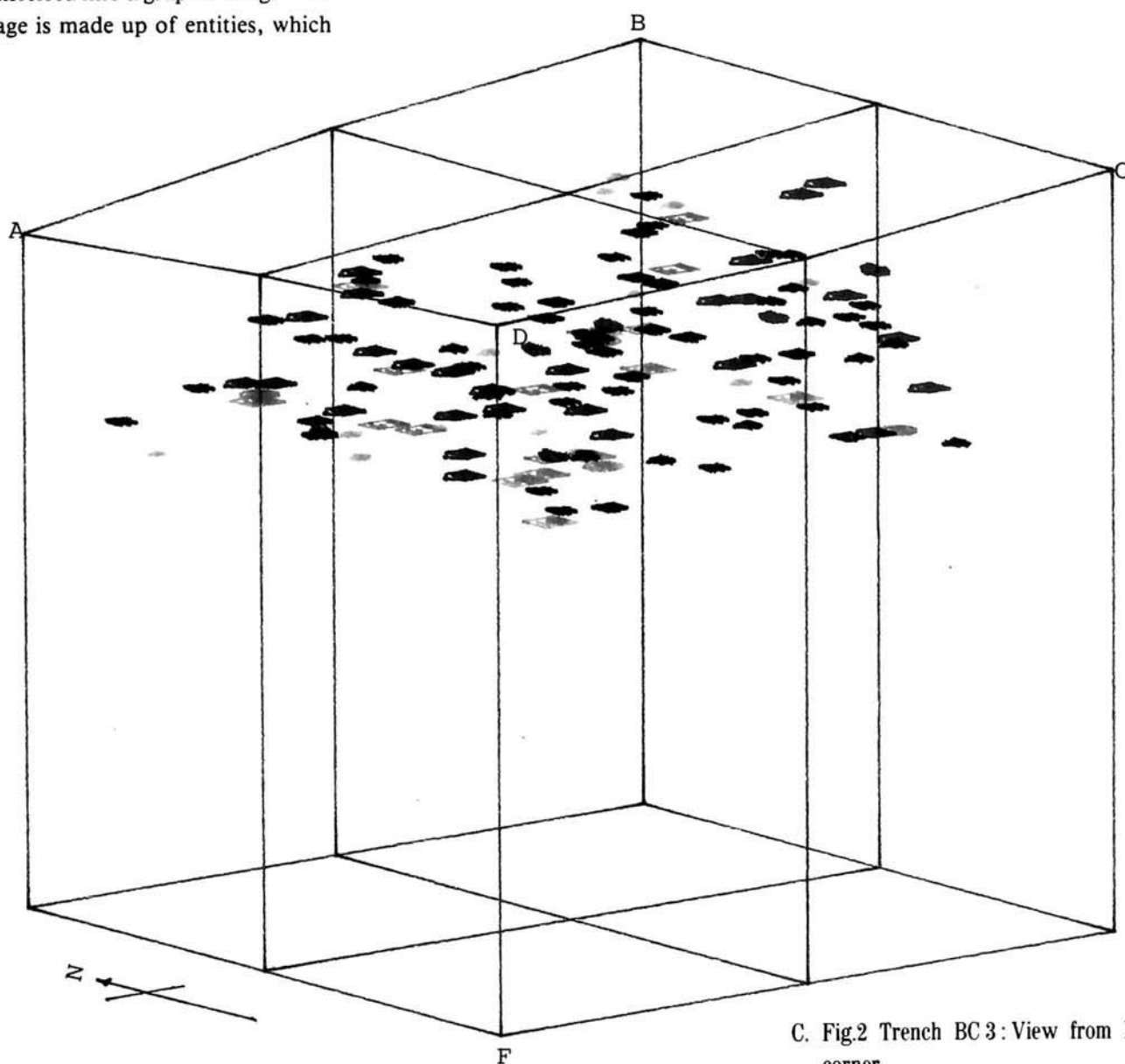
or 80386 processors and 80287 or 80387 co-processors would allow for faster speed) model, supported by a better than average resolution monitor, such as an EGA or VGA monitor. Drawings can then be reproduced in hard copy through the use of a plotter. Data can be entered into the programme using the keyboard, but a faster way is through the use of a mouse and digitizing tablet.

Under the programme, a File is opened for information that can be transferred into a graphic image. The image is made up of entities, which

can be lines, circles or squares. These entities are entered according to a Cartesian coordinate system, i. e., with an X and Y axis. Depth is provided by the Z axis, completing a three dimensional spatial depiction of all the lithic artifacts recovered (Fig. 2). Representations can be made according to the range of different colours available or the various shapes.

In the application of this programme to the Kota Tampan site

(Map 1), the following abilities of the programme were used. Each artifact, except for debitage, was represented by an entity (Fig. 3). Each find was then given a three-dimensional reference point and charted. The traverse co-ordinate system was adopted with each trench measuring 1×1 metre. A co-ordinate system was adopted with



C. Fig.2 Trench BC 3: View from DF corner.

the point of intersection acting as a reference point for each trench. With A as the reference point, the X coordinate was AB (North) while the Y coordinate was AD (West). The vertical depth was measured from the datum point (Fig. 2). Although both surface and datum point readings were taken, only the datum point

measure was used.

In addition, the following colour system was adopted for representing pre-classified artifacts:

- flake tool (red)
- pebble tool (yellow)
- anvil (green)
- core (light blue)
- hammerstone (orange)
- debitage (blue)

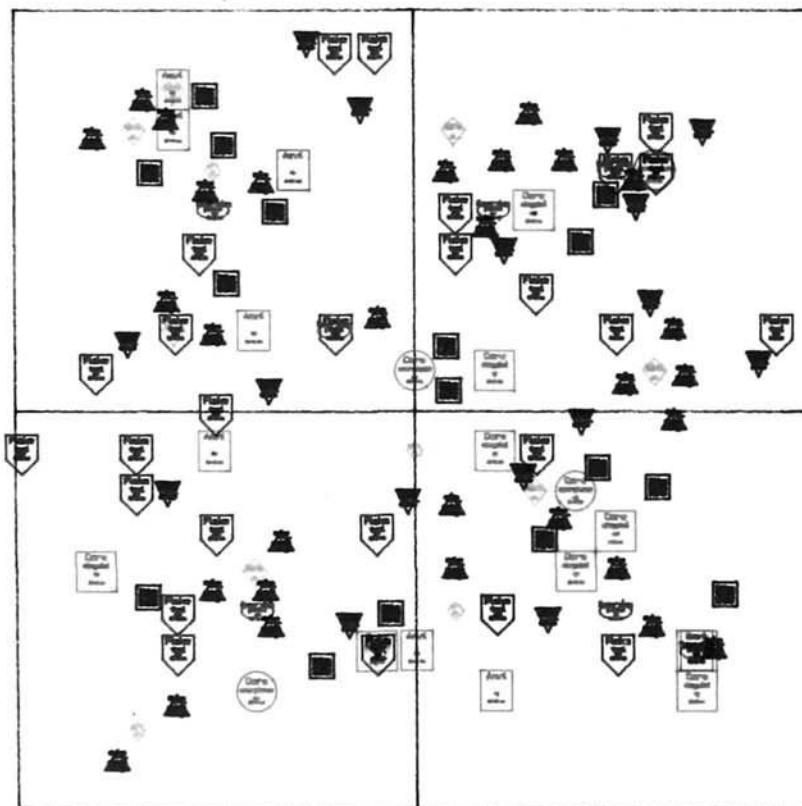
D. Fig.3 Data contained in an entity.

* identification tag or registration number containing further details on the artifact.

The depiction of the type of artifacts were further subclassified. For example, in the case of pebble tools, they were subdivided into choppers, scrapers, points, oval unifacial and palaeo-adzes. In all cases, the artifacts were depicted, using different shapes such as squares and circles (Fig.4). There do not represent the actual shape of the artifacts. Rather, they are used to make graphic presentations clearer. Although data recorded manually included the size (length, width) and the weight of each artifact, these data were not entered into the computer file for this programme. These data were fed into dbase III+.

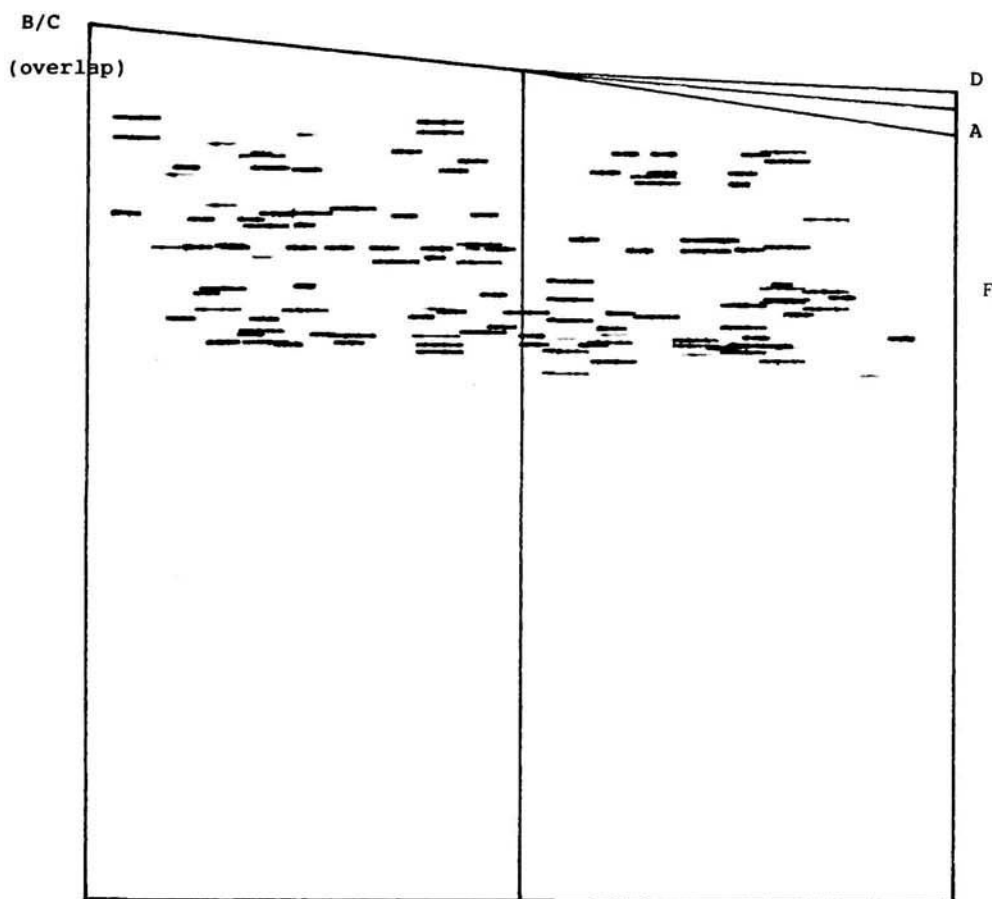
In the manual recording, a registration number was tagged to each artifact (Fig. 3). In the Au-

E. fig.4 Plan of Trench BC 3.



Legend

-  **Flake Tool**
-  **Elongated Core**
-  **Amorphous Core**
-  **Anvil**
-  **Hammer Stone**
-  **Pebble Tool**
-  **Waste Flake**
-  **Chips**
-  **Chunks**



F. Fig.5 Trench BC 3: Side view from the north (AB wall).

toCADTM programme, although this number was keyed in, no tracing ability was built-in into the programme using this number. Tracing could however be done by specifying the co-ordinates, in which case the numbers assigned to each artifact, within those co-ordinates, would be shown.

Changes may be made to any of the original entries. The display can be shown using any specified angle (Figs. 2 & 5). The programme also has the ability to combine every trench into a total picture (Fig. 6). How useful the final picture is depends on whether the density causes too much overlapping in the different layers of the artifacts to be shown clearly or sharply. Unless the artifacts are very dense, the program is on its own. Because of its three dimensional properties, to some extent, it is able

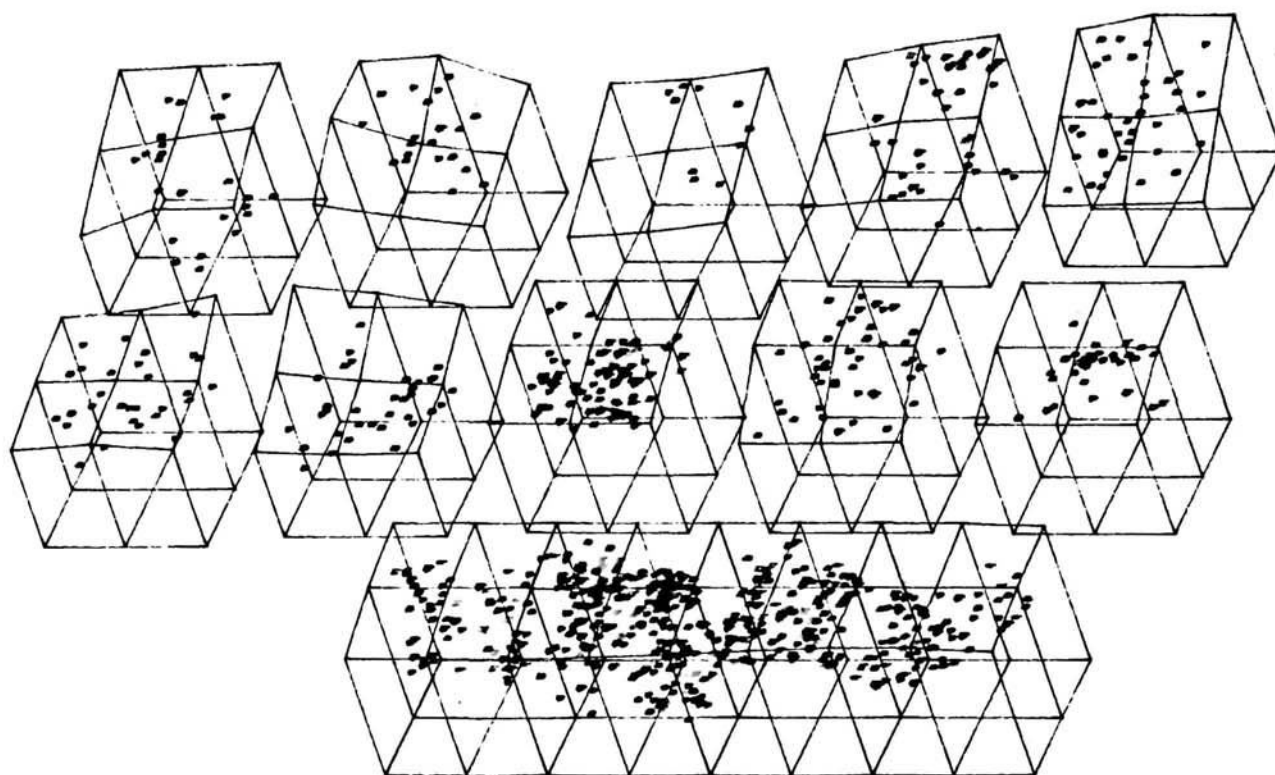
to overcome the problem posed by overlapping artifacts. Once the basic framework is established for a comprehensive data base, it would be possible to visually link "both the sequential relationships between strata and the context of the layer's finds". (Joukowsky 1980:220). In other words, the finds can be visually compared through time and at any one point of time. Together they form a master plan of the entire excavated site.

When completed, one particular use of this programme is to investigate if the time sequence among the different levels in the excavation can be shown to be significant. Also, the association of the different lithic artifacts will be able to indicate the technology and the method of tool manufacturing as well as the spatial

use of the site. In this site, at Kota Tampan the artifact level once consisted of volcanic ash. When chemically matched and dated through fission track, the artifact level revealed that it originated from the last major eruption of Lake Toba, around 31,000 years ago.

Limitations and Strengths

As visually dramatic as the depictions are, there are perhaps limitations to the use of the programme for purposes of numerical analysis. There is no mention of interface ability between AutoCAD^M to other computer system software, such as the Statistical Package for the Social Sciences (SPSS), Lotus 1-2-3 or Dbase III+ or IV. for the purposes of using these other software, the data will have to be laboriously keyed



G. Fig.6 3D View of Kota Tampan Palaeolithic Workshop site -- aerial view from a southwest angle.

in again. Once keyed in, however, there can be integration, for instance, between Dbase IV and Lotus 1-2-3.

Autolisp programming can be used for organising statistics. For example, it can be used for producing simple, relative or cumulative frequencies, plotting graphs, or calculating the mean or standard deviations. This is now being explored in our analysis.

AutoCADTM is able to extend graphic descriptions nearer to the ideal of having a nearly total reconstruction of the excavation finds in-situ. They complement drawings and photographs. They also provide a possible universally acceptable system of codifying data. Until recently, vertical and spatial depictions of ar-

tifacts in a site have been two dimensional only. This gave rise to inaccurate representations, not usable as a tool in analysis. The additional advantage of AutocadTM is that it does not only provide comparable descriptions but also nearly totally complete files of the entire mass of material found. It allows anyone the flexibility of studying any one class of artifacts, whether over time or at any one point of time.

Acknowledgement

The application of AutoCADTM to this excavation was made possible through a grant from Universiti Sains Malaysia. For this, I am most grateful to Vice-Chancellor Y. Bhg. Datuk Musa Mohamad for his confidence in the project. Several

people have contributed towards the achievement of a three-dimensional recording system for the excavations. My thanks especially goes to student assistants Ng King Wah, Khoo Poh Soon, Lim Hong Peng and Chong Kim Fat, for their meticulous work and commitment to the project. I am also grateful to Professors Tan Wang Seng and Vincent Lowe, as well as Mr. Norizal Noordin for their advice and guidance.

REFERENCE

Joukowsky, M. **A Complete Manual of Field Archaeology : Tools and Techniques of Field Work for Archaeologists.** Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1980 p.630.