

PRELIMINARY REPORT ON THE MEASUREMENT OF ARCHITECTURAL ELEMENTS ON THE FAÇADES AT PETRA

by
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Introduction

Between October 1981 and January 1982 the authors spent a total of two and a half months at Petra recording the architectural elements of the principal monuments and measuring the mouldings on the façades using a theodolite.

The success of the project was dependent on the logistical support provided by Dr. Adnan Hadidi, Director-General of the Department of Antiquities of the Hashemite Kingdom of Jordan and Prof. J. B. Hennessy, and we are indebted to them. Appreciation is also expressed to the University of Sydney Pella Expedition and Department of Civil Engineering, and to the British Institute at Amman for Archaeology and History and its Director Mrs C.-M. Bennett, O.B.E., for the use of equipment.

Thanks are also due to Dr. Youssuf M. Siyam of the Faculty of Engineering and Technology at the University of Jordan, and to Mrs. Susan M. Balderstone for helpful discussions about the surveying technique. Mr. Nabil el-Qadi and Mr. Mohammed Murshed also provided assistance.

The final report will form the basis of a post-graduate thesis by Judith McKenzie at the Department of Archaeology, University of Sydney, Australia, under the supervision of Drs. A. W. McNicoll and J. P. Descoedres.

Some explanation is necessary to justify the survey, as considerable work has been carried out in Petra already.

The traditional sequence of tomb façades at Petra was established by R. E. Brünnow and A. von Domaszewski (*Die Provincia Arabia* I, 1904). They established a typology of the tombs, dividing them into seven main groups based on the number of classical elements present.

They then suggested that these groups formed a chronological sequence when placed in order of increasing complexity, which involved an increasing presence of classical elements.

However, at Medain Saleh, tombs of Brünnow and Domaszewski's first four types (pylongrab, Stufengrab, Proto Hegrtyt and Hegrtyt) have inscriptions for the period from A.D. 1 to 76. This shows that in the first century A.D. Brünnow and Domaszewski's first four types were chronologically parallel and not in sequence.

Attempts have been made to date the Khasneh by comparing it with dated evidence not from Petra. However, this method has not yielded decisive results as it suggests a date either in the first century B.C. or the second century A.D.

In the last twenty-five years sufficient excavation of free-standing monuments at Petra has been carried out to elucidate the chronology of the classical rock façades. However, until the present study no detailed examination and synthesis of this evidence has been carried out. Hammond, Wright and Parr have concentrated only on those monuments which they themselves have excavated.

An examination of the dated façades at Medain Saleh shows that there was a marked degeneration of classical elements during the first century A.D.

An examination of the published material from Petra indicated that a similar degeneration appeared to occur at Petra. However, as few of the architectural details of the façades were published it was necessary to conduct fieldwork to collect sufficient evidence to test the hypothesis.

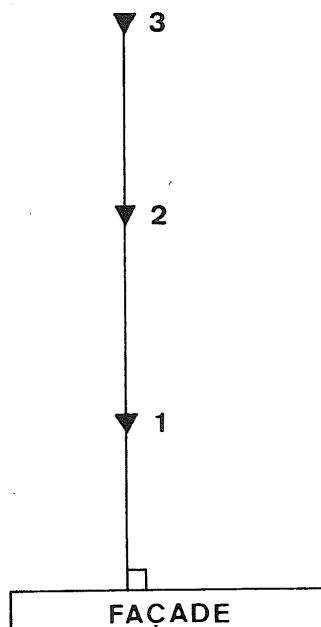
From the drawings of the mouldings and other measurements and information

collected it is possible to establish a sequence for the classical façades which is confirmed by the monuments dated by epigraphic evidence.

Method for Measuring Inaccessible Mouldings

As the mouldings are often inaccessible due to the height of the façades it was necessary to devise a method of measuring them from the ground level. It was decided to use a theodolite. Considerable time had to be spent refining the method to suit the characteristics of the site.

The method used was briefly as follows: three theodolite stations (1, 2 and 3) were set up on a base line which was established perpendicular to the least weathered part of the face of the façade (Fig. 1). At each station the horizontal circle of the theodolite was clamped perpendicular to the façade, then the vertical angles to the points of intersection of



PLAN VIEW

Fig. 1

surfaces (A and B in Fig.2) on the mouldings were recorded at each of the three stations. The length of the baseline (z) was measured, and the levels of stations 1, 2 and 3 were recorded. Using trigonometry the position of points A and B were plotted. Line AB was drawn in free-hand.

The use of three stations rather than two stations creates a triangle of error which indicates the accuracy of the results. This showed that the results are accurate to 0.01 m. at a distance of 40.00 m.

A Cooke, Troughton and Simms V208 theodolite with a prismatic eyepiece was used. The smallest division on it was 1 minute, allowing readings to $\frac{1}{3}$ minute. Greater accuracy is not required as measurements of mouldings on the ground show that a variation of two or three centimetres in an individual element is quite common.

To illustrate the accuracy of the method a control was conducted by measuring the guttae block which was *in*

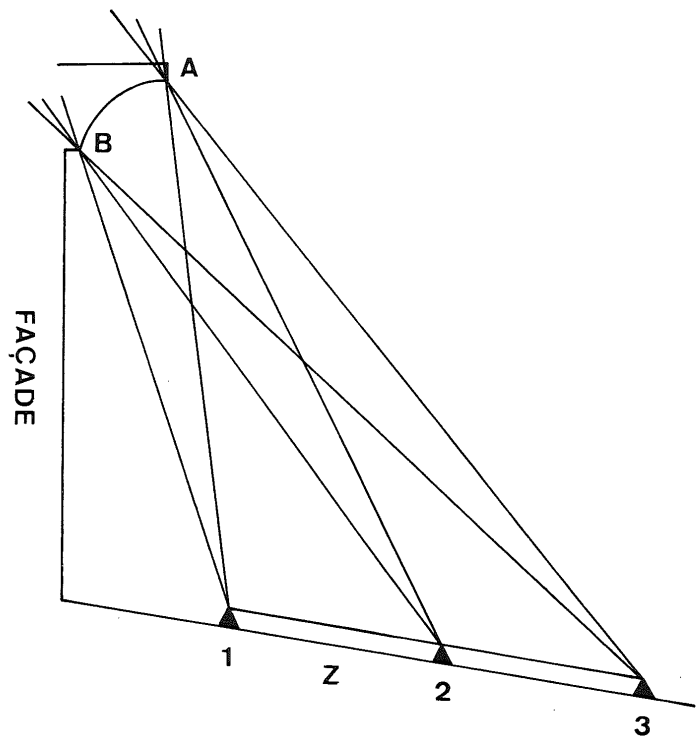
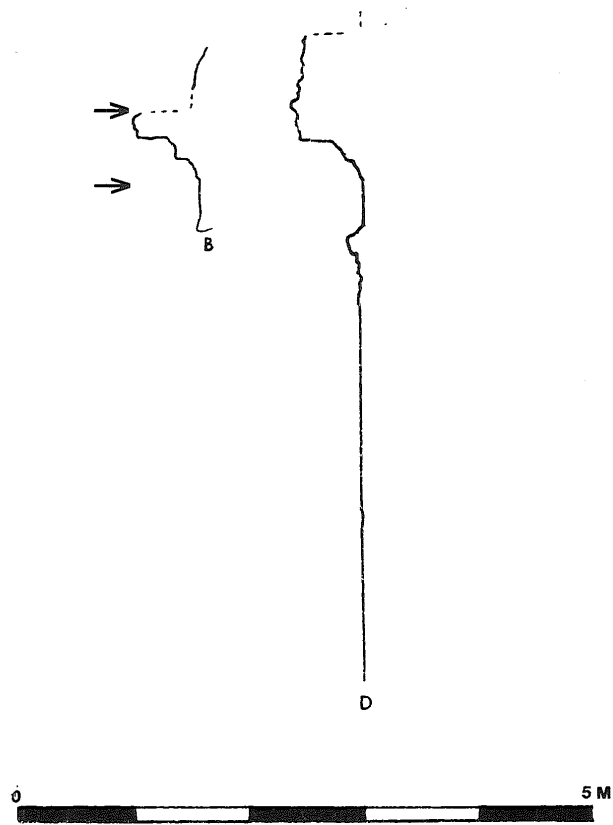
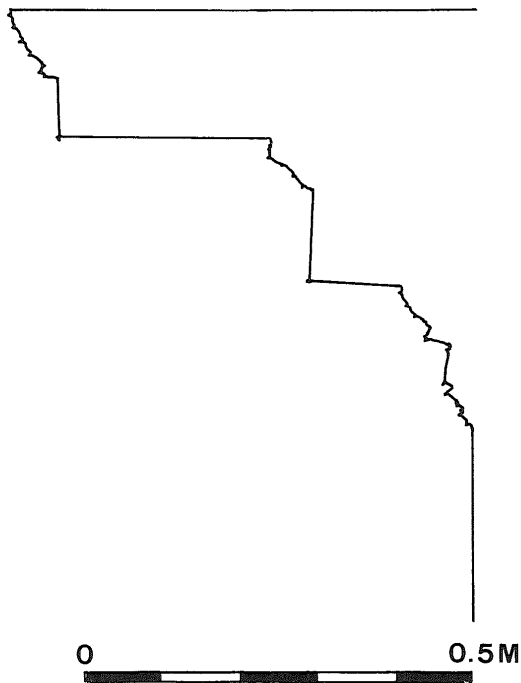


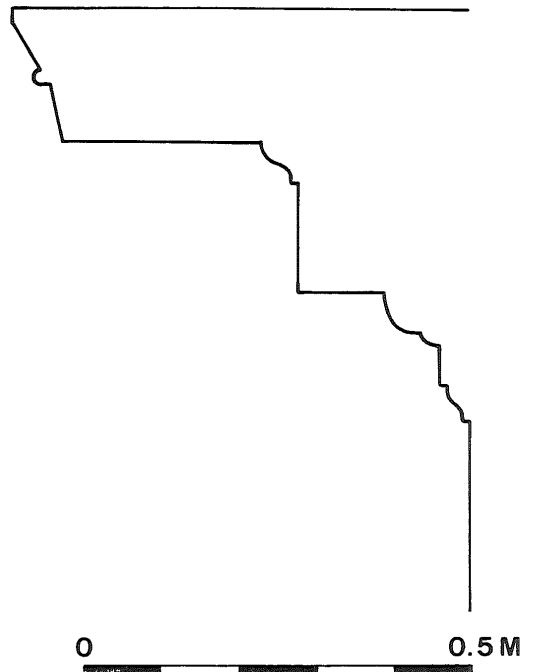
Fig. 2



(a) photogrammetry plot as published¹



(b) Photogrammetry plot²



(c) Theodolite plot

Treasury. Doorway of chamber on southern side of Vestibule.

Fig. 3

(1): P. J. Parr et al., *ADAJ* XX (1975) fig. 2
 (2): Courtesy of Petra Excavation Fund and the Department of Photogrammetry and Surveying, University College London.

situ on the Qasr el Bint and measuring a fallen one on the ground using a tape measure. The two drawings produced were the same.

A step by step description of the method with sufficient detail to be followed in the field by an archaeologist or architect is in preparation.

It is possible to obtain similar section drawings using photogrammetry. However, photogrammetry is a much more expensive method involving the use of expensive equipment and technical expertise.

The photogrammetry plots of sections which have been published are of little use as they are at much too small a scale to show any detail (Fig. 3a). Furthermore, little consideration has apparently been given to the amount of weathering on the part of the façade chosen for the section. Better photogrammetric results are obtained if plotting is done at a larger scale (Fig. 3b). A comparison of the plots from the two methods can be seen by an examination of Fig. 3. The part illustrated in Fig. 3b and Fig. 3c occurs between the arrows in Fig. 3a.

Using the theodolite all the mouldings of the following facades were measured:

Khasneh

Deir

Urn Tomb

Palace Tomb

Corinthian Tomb

Tomb of the Roman Soldier

Triclinium of the Tomb of the Roman Soldier

Lion Triclinium

Renaissance Tomb

Tomb of Sextus Florentinus

Turkmaniya Tomb

Tomb 813

Tomb 825

Tomb 649

The mouldings on the Bab el Siq Triclinium and the Tomb with the Broken Pediment were too weathered to measure.

The plotting is at present in progress and the analysis of the material should be completed by the end of the year.

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