

# 1995 ARCHAEOLOGICAL EXCAVATION OF THE SOUTHERN TEMPLE AT PETRA, JORDAN<sup>1</sup>

by

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## Introduction

This report presents the results for the third year of archaeological survey and excavation of the Southern Temple ('Great Temple') at Petra conducted under the auspices of the Jordanian Department of Antiquities. These archaeological investigations from June 17 to August 15, 1995 were sponsored by Brown University, Providence, Rhode Island, U.S.A.<sup>2</sup> Located to the south of the Colonnaded Street near the Qasr al-Bint Temenos Gate, this 7000 square meter Temple Precinct is comprised of a stepped Propylaea leading into a newly-discovered double-colonnaded, hexagonally-paved Lower Temenos, which is bounded on the east and

west by elegantly apsed Exedrae. A partially uncovered 'Grand Stairway' leads up to the Upper Temenos and to the Southern Temple itself (Fig.1). The Southern Temple was opened to exploratory research in 1993, and excavations have continued in 1994 and 1995 with the investigation of several temple areas. In 1995 the focus was on the Pronaos and Adyton in the Temple and other *in situ* features of the Lower Temenos — the West Exedra, the East Colonnade, and the subterranean canalization system.<sup>3</sup>

## Strategy<sup>4</sup>

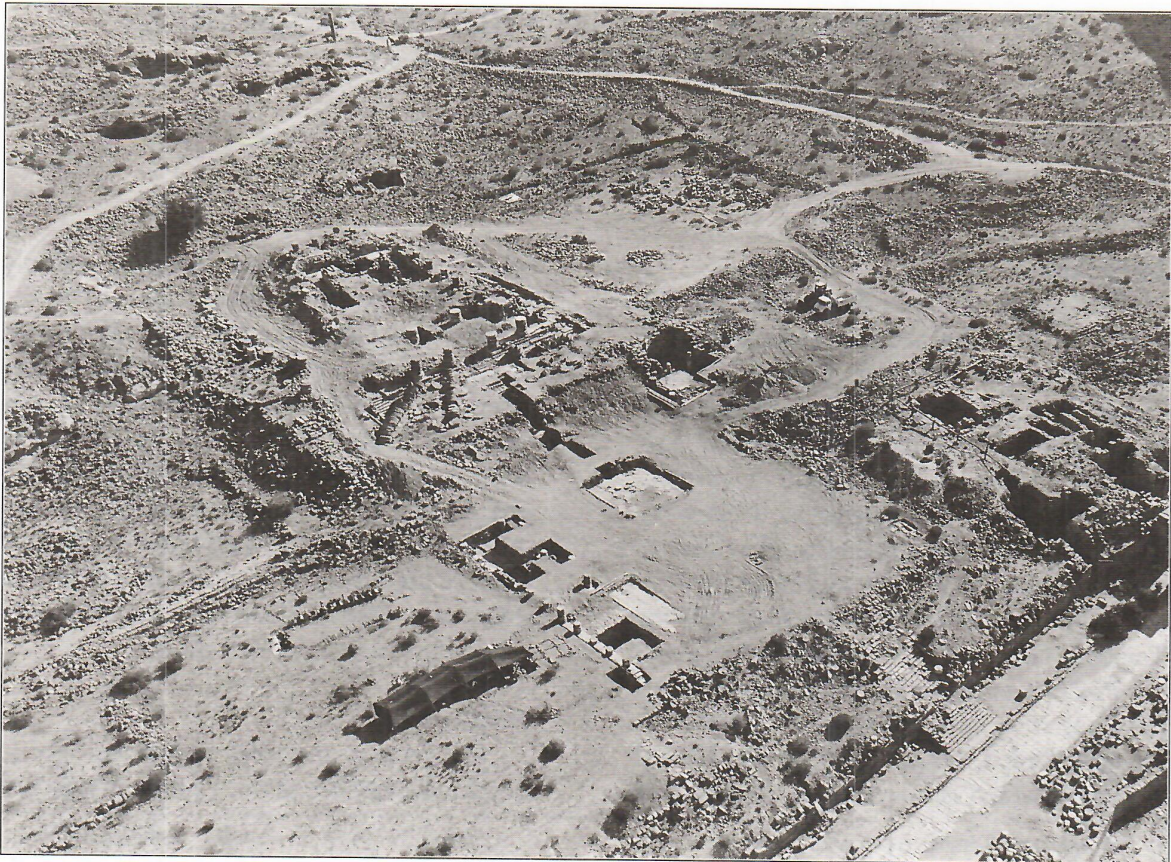
The goals of the 1995 season were to: 1) continue clearance of the Temple Precinct of

1. The Southern Temple represents one of the major archaeological and architectural components of the city, as well as one of the largest temple structures to be found at Petra. The Southern Temple lies to the south of the Colonnaded Street and southeast of the Temenos Gate. It occupies a position of paramount importance. From north to south the Southern Temple Precinct is comprised of a Propylaea, which leads to a sacred area or Lower Temenos ending in what we posit is a monumental 'Grand Stairway' which in turn leads to the Upper Temenos, the sacred enclosure for the temple proper.
2. The staff was comprised of M. S. Joukowsky, Director; A. W. Joukowsky, Administrator and Photographer; E. Schluntz, Assistant Director; L. Traxler, Chief Architect-Surveyor; G. Bilder, Computer Analyst; M. Slaughter, Photographic Recorder and Photo Development; L.-A. Bedal, Ceramic Analyst, K. Mallak, Finds Recording; J. Blackburn, Draftsperson; T. Tullis, Geologist, Brown University; D. Brill, Professional Photographer; Senior Archaeologists, E. Payne, J. Basile, J. Bell, L. Sisson, J. Rucker, L. Tholbecq, and field workers F. Ra'ad, L. Khalidi, A. Harris, Z. Habbou; and volunteers R. Ballou, F. Bennett, C. Bennett, N. Koprulu, P. Boczkowski, D. Quigley, J. Nicholas, C. Tullis, C. Worthington, W. Azoy, S. Scott, Fr. A. Scott, and M. Sylvester. G. Abbadi was assigned to us by the Department of An-

tiquities for help in moving architectural components, soil removal. His service to us was indispensable. Besides T. Tullis, 1995 Southern Temple Consultants included C. Augé, numismatics, S. Schmid, Nabataean fine wares analysis, and P. Warnock, botanical materials analysis.

Under the general supervision of Suleiman Farajat, the Department of Antiquities of Jordan assigned Mohammed Abd Al-Aziz (Al-Ghunmiyyin) as our Department of Antiquities representative.

3. The Southern Temple canalization system excavations and GPR survey have been covered in The Water Canalization System of the Petra Southern Temple. in *SHAJ* VI (in press).
4. The site-specific excavation strategy created in 1993 was further developed in 1995. This included the use of Electronic Distance Measurement (EDM) interfaced with the COMPASS program developed by MASCA of the University of Pennsylvania and our site specific computer data base, with a consistent nomenclature. Site datum and sub-datum points were established in 1993. Topographic and *in situ* positions of architectural components have been acquired in relation to set points with absolute elevations. The Petra Southern Temple Precinct is approximately 113m north-south by 55.68m east-west. The Petra site al-Katuta and Zibb Fir'awn outcrops lie at 908m above sea level. Our site datum point, known as Pt. 103, has an elevation of 895.48m or is 12.52m below Zibb



1. Aerial photograph of the Petra Southern Temple, looking southwest (Photograph by A. A. W. Joukowsky).

earthquake debris and to clarify its architectural plan; 2) investigate and assess the nature, extent and depth of the stratigraphy within the various areas of the Temple Precinct; 3) provide an up-dated working plan of the precinct design by survey (Fig. 2); 4) chart the Temple's stratigraphy and phases of use, and 5) to consolidate portions of the excavated remains.

### Phasing the Deposits

While specific chronological information from coins and pottery is not yet avail-

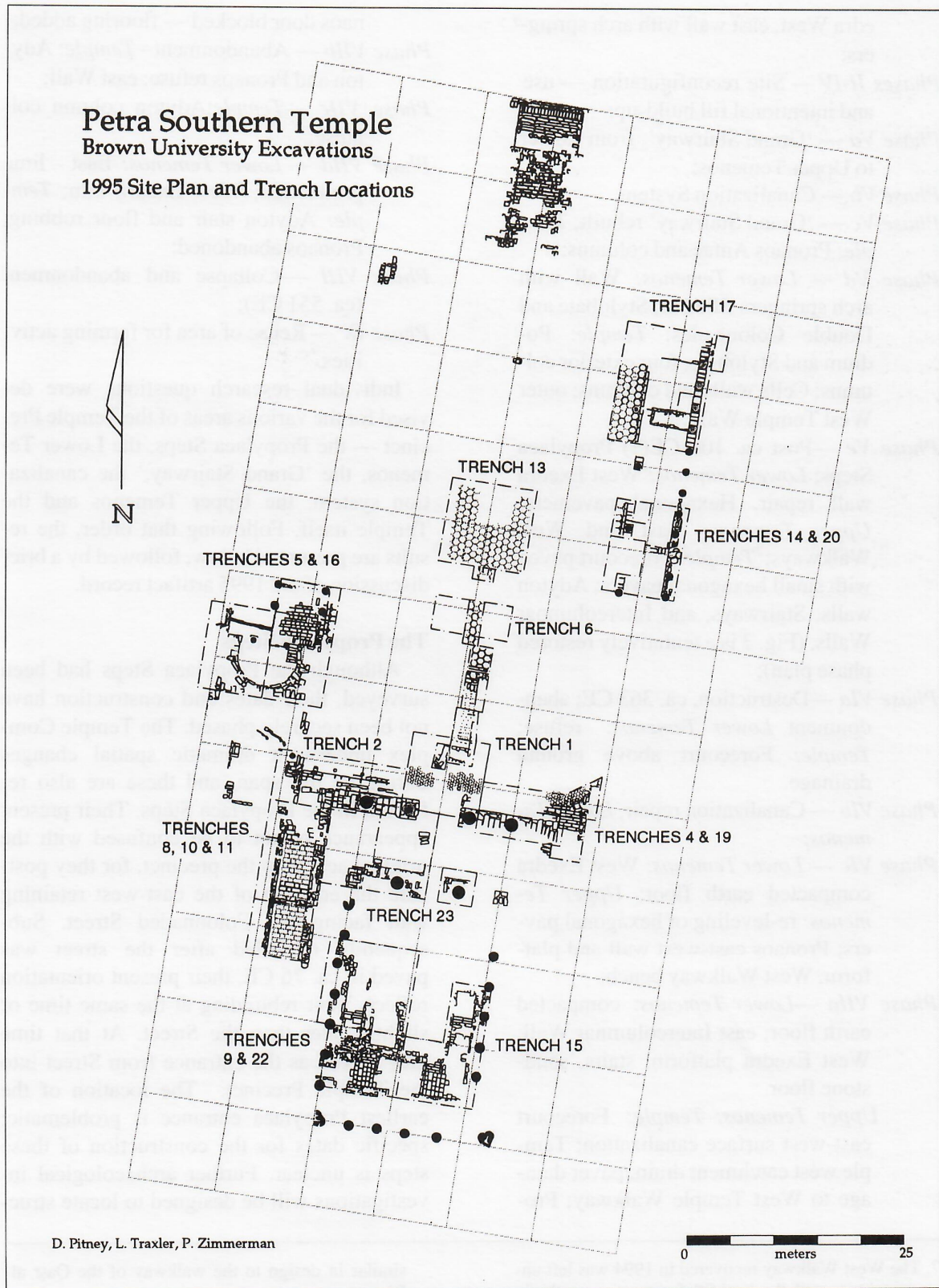
able, it is possible to create a relative chronology, based on stratigraphy and architectural phasing. The documentary research indicates that as many as 18 phases are now represented within the Petra Southern Temple precinct from its founding in the first century CE to its demise at some point in the Byzantine period.<sup>5</sup> Examination of these factors has suggested the following construction developments, from earliest to latest.

*Phase I* — (pre-106 CE) *Propylaea*: east retaining wall;<sup>6</sup> *Lower Temenos*: Ex-

Fir'awn . The Upper Temenos hexagonal pavement of the Temple Forecourt has an elevation of 884.41m — there is an 11.07m difference between it and Pt. 103. The Lower Temenos elevation of the large hexagonal pavers is 878.50m — there is thus a differential of approximately 6m between Lower Temenos and Upper Temenos. The Colonnaded Street has an elevation of 871.18m — there is a 7.5m differential between it and Lower

Temenos. There is a 37m differential between Zibb Fir'awn and the Colonnaded Street.

5. These phases are not meant to be cast in concrete. They only represent an approximation on the basis of the available data.
6. Also included in the phase is the Trench 7 wall recovered in 1994 in the lapidary west, which lies outside the Southern Temple precinct.



2. 1995 Site plan with trenches. (D. Pitney, L. Traxler, P. Zimmerman).

- edra West, east wall with arch springers;
- Phases II-IV* — Site reconfiguration — use and intentional fill build-up;
- Phase Va* — ‘Grand Stairway’ from Lower to Upper Temenos;
- Phase Vb* — Canalization System;
- Phase Vc* — ‘Grand Stairway’ rebuilt; *Temple*: Pronaos Antae and columns;
- Phase Vd* — *Lower Temenos*: Wall with arch springers filled in; Stylobate and Double Colonnades; *Temple*: Podium and Stylobate, four exterior columns; Cella walls and columns; outer West Temple Wall;
- Phase Ve* — Post ca. 106 CE(?) Propylaea Steps; *Lower Temenos*: West Exedra wall repair. Hexagonal pavement. *Upper Temenos*: East and West Walkways;<sup>7</sup> *Temple*: Forecourt paved with small hexagonal pavers; Adyton walls, Stairways, and Intercolumnar Walls. (Fig. 3 is a tentatively restored phase plan);
- Phase VIa* — Destruction, ca. 363 CE; abandonment *Lower Temenos*: refuse; *Temple*: Forecourt above ground drainage.
- Phase VIb* — Canalization repair, *Lower Temenos*;
- Phase VIc* — *Lower Temenos*: West Exedra compacted earth floor; *Upper Temenos*: re-leveling of hexagonal pavers; Pronaos east-west wall and platform; West Walkway bench;
- Phase VIIa* — *Lower Temenos*: compacted earth floor; east Intercolumnar Wall; West Exedra platform, stairs, sandstone floor.
- Upper Temenos*: *Temple*: Forecourt east-west surface canalization; Temple west catchment drain; paver damage to West Temple Walkway; Pro-

- naos door blocked — flooring added;
- Phase VIIb* — Abandonment - *Temple*: Adyton and Pronaos refuse; east Wall;
- Phase VIIc* — *Temple*: Adyton column collapse;
- Phase VIId* — *Lower Temenos*: East - lime production; West Exedra kiln; *Temple*: Adyton stair and floor robbing, Pronaos abandoned;
- Phase VIII* — Collapse and abandonment (ca. 551 CE);
- Phase IX* — Reuse of area for farming activities.

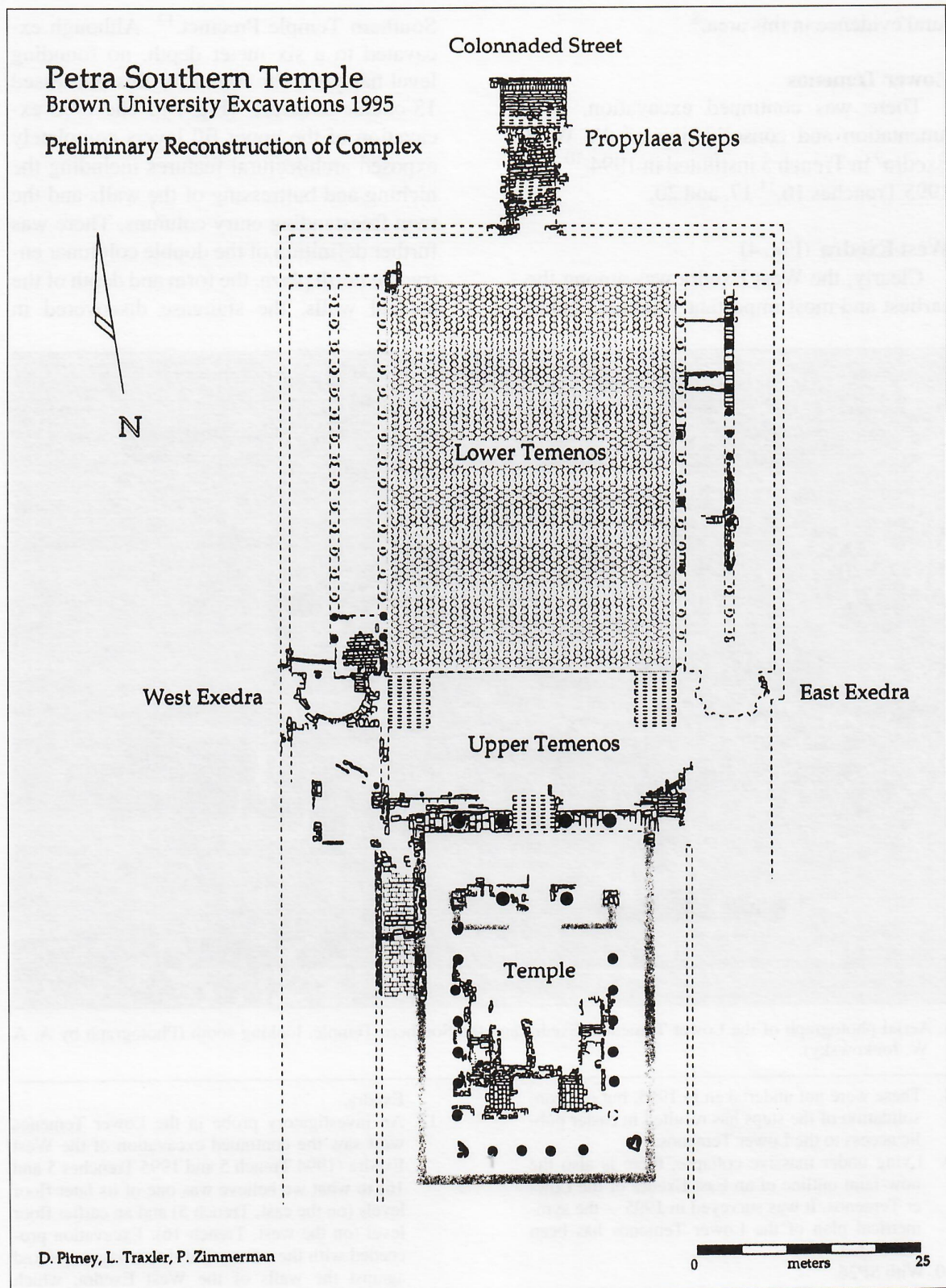
Individual research questions were devised for the various areas of the Temple Precinct — the Propylaea Steps, the Lower Temenos, the ‘Grand Stairway,’ the canalization system, the Upper Temenos and the Temple itself. Following that order, the results are presented below, followed by a brief discussion of the 1995 artifact record.

### The Propylaea Steps

Although the Propylaea Steps had been surveyed, their dates and construction have not been securely phased. The Temple Complex underwent dramatic spatial changes during its life span, and these are also reflected in the Propylaea Steps. Their present appearance is not to be confused with the original access to the precinct, for they post-date the erection of the east-west retaining wall facing the Colonnaded Street. Subsequently modified after the street was paved in ca. 76 CE, their present orientation reflects their rebuilding at the same time or slightly later than the Street. At that time they served as the entrance from Street into the Temple Precinct. The location of the earliest Propylaea entrance is problematic; specific dates for the construction of these steps is unclear. Further archaeological investigations will be designed to locate struc-

7. The West Walkway recovered in 1994 was left unexcavated until the backfill from more southerly trenches could be disposed of. This walkway is

similar in design to the walkway of the Qaşr al-Bint.



3. Reconstruction of the Late Nabataean reconstruction phase (D. Pitney, L. Traxler, P. Zimmerman).

tural evidence in this area.<sup>8</sup>

#### Lower Temenos

There was continued excavation, documentation and consolidation of the West Exedra<sup>9</sup> in Trench 5 instituted in 1994,<sup>10</sup> and 1995 Trenches 16,<sup>11</sup> 17, and 20.

#### West Exedra (Fig. 4)

Clearly, the West Exedra was among the earliest and most important structures in the

Southern Temple Precinct.<sup>12</sup> Although excavated to a six meter depth, no founding level has yet to be found for this buttressed 13-course structure (Fig. 5). The 1995 excavation of the upper fill layers completely exposed architectural features including the niching and buttressing of the walls and the twin freestanding entry columns. There was further definition of the double columnar entry, the north plaza, the form and depth of the apsidal walls, the staircase discovered in



4. Aerial photograph of the Lower Temenos, Exedra and the Southern Temple, looking south (Photograph by A. A. W. Joukowsky).

8. These were not undertaken in 1995, but our consolidation of the steps has resulted in easier public access to the Lower Temenos.
9. Lying under massive collapse, there is also the now-faint outline of an East Exedra of the Lower Temenos. It was surveyed in 1995—the symmetrical plan of the Lower Temenos has been elucidated.
10. With SP26.
11. With SP 31- SP 33. SP 37 involved the partial clearing of Bedouin blocks to the north of the

Exedra.

12. An investigatory probe in the Lower Temenos west saw the continued excavation of the West Exedra (1994 Trench 5 and 1995 Trenches 5 and 16) to what we believe was one of its later floor levels (on the east, Trench 5) and an earlier floor level (on the west, Trench 16). Excavation proceeded with the removal of debris layers packed against the walls of the West Exedra, which formed a 6m high escarpment linking the Upper Temenos and the Lower Temenos.

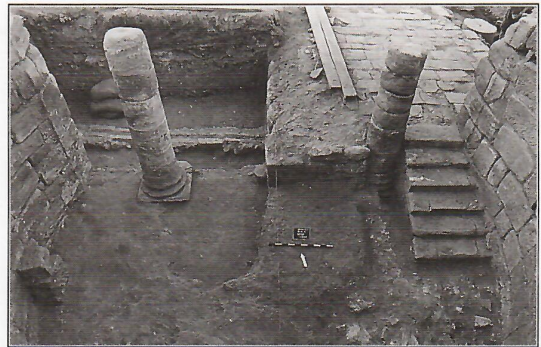


5. West Exedra, looking southwest (Photograph by A. A. W. Joukowsky).

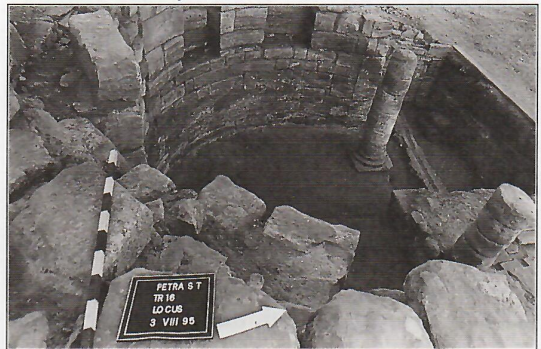
1994, and the location of floor levels and foundation levels. New architectural components were revealed. As can be seen in Fig. 6, the platform floor uncovered in 1994 did not continue westward, however, a founding floor level for the stairs was recovered. (There was no western engaged column to mirror the east column recovered in 1994 — where the elephant-headed capital was discovered.) Additionally there was the appearance of a north-south wall in the northwestern part of the trench which was partially contemporary with the apsidal wall, and formed a natural boundary in the extreme northwestern corner of the trench. Between two floors of later re-use was a sealed fill layer containing significant numbers of bones, shells, charcoal deposits, and ceramic remains. In addition, under the packed surface north of the West Exedra proper, a shallow water channel (Fig.7) was excavated, resting on a footing of pebbles. There was

13. Each curbstone is 79cm wide, 38.5cm long, and 16.5cm in thickness.

14. They measured 1.28m in length. Its upper elevation at the north was 879.57m, and at the south



6. West Exedra, looking north (Photograph by A. A. W. Joukowsky).



7. West Exedra, looking northwest (Photograph by A. A. W. Joukowsky).

the additional recovery of architectural features in the north that suggest the beginnings of foundation courses for the West Exedra walls.

Phase I was assigned to the laying of the foundation, Stylobate, string course, bedding, and floor levels of the West Exedra and the water channel north of the structure. There was then construction of the apsidal Exedra wall with niches and buttresses, the north-south wall of the northwestern corner, and the twin freestanding entry columns.

In Phase Vd the West Colonnade was constructed with columns averaging 81cms. in diameter. Following soon thereafter in the West Exedra east was a small segment of the Lower Temenos Hexagonal Paving with curbstones laid at an elevation of 879.33m,<sup>13</sup> as well as a column resting on the raised Stylobate.<sup>14</sup> Variegated red and white rec-

was 879.505m. The bottom elevations at the north end were 879.31m, and at the south were 879.33m.

tangular curbstones<sup>15</sup> delimited the western edge of the Hexagonal Pavement,<sup>16</sup> and interspatial triangles between the pavers formed a straight western edge which abutted the curbstones. Set into the center of the southernmost hexagonal paver was a hexagonal bronze drain fitting.<sup>17</sup>

In Phase Ve, repairs were made to the West Exedra, including the south part of its apsidal wall (between the two south buttresses) and the north sector of its west north-south wall. While the West Exedra wall appeared to have been constructed in the traditional Nabataean style with large well-fitted, diagonally dressed ashlar, the center of its arc was obviously a later modification or perhaps a repair, since its masonry style is vastly different.<sup>18</sup>

In Phase VIa there was fill and squatter occupation, represented by the robbing of features associated with the initial use phase of the West Exedra, which we have tentatively dated to ca. late third - late fourth centuries CE. Under a late floor bedding was a dis-

tinctive fill suggesting a period of abandonment or squatter occupation before its later reuse; it contained a homogenous assemblage of Nabataean painted plates and fine wares.

In Phase VIIa there was reconstruction and reuse of the West Exedra, by 1) the construction of rubble walls between the two freestanding entry columns, 2) a stone platform between these walls, another new wall, a roughly paved floor,<sup>19</sup> with stairs leading down to 3) a floor bedding of sandstone flags and cobbles<sup>20</sup> (Fig.6). At this same time a north-south wall was constructed on the east side of the West Exedra, incorporating both the *in situ* columns and drums — it apparently served as a retaining wall for the stone platform of the Exedra north. The reused stones were either robbed from earlier structures or were found lying around; they were dry-laid and mortarless — earth and chinking stones filled the spaces after which a coat of plaster was applied over the wall itself. Underlying top soil was yet another north-

15. This is intentional not only because it is aesthetically pleasing but because the same pattern is found on the eastern edge of the colonnade in the Lower Temenos (Trench 14 1995); apparently the curbstones are used as a transitional decorative element between the hexagonal pavers and the retaining wall.

16. Trenches 6 and 13, 1994, and in Trench 14, 1995. Each paver is 80cm wide (flat side to flat side). Their thickness is 16cm and each side of the hexagon is 46cm.

17. Finding the hexagonal pavement and curbstones ties the eastern side of the West Exedra with the rest of the Lower Temenos. The bronze drain fitting may reveal another part of the canalization system of the temple — this drain is 18cm to a side and 29.5cm across. Its center hole is 13.5cm in diameter. Apparently formed in one piece with the flat hexagonal plate is a pipe extending vertically 27cm down through the paving stone. This pipe has two vertically oriented oval holes approximately 15cm from the top. They measure approximately 4 by 1.5cm. There are shallow channels cut into the pavement block into which it is set, and the cavity underneath it, made us question if it served as part of the major subterranean canalization system. A probe inside the drain brought up very loose sandy soil,

somewhat moist, of a coarse consistency with small amounts of bone, pottery, and very small stones. It is impossible to see into the drain, but examination by touch seems to indicate an almost completely filled channel.

18. There is no attempt at regular coursing, and irregular rounded stones are used extensively. There is also reuse of other architectural elements, such as door jambs, tiles, and stones used for chinking.

19. This floor footing was found at an elevation of 879.87m. It is a very irregular surface of multi-colored sandstone blocks and cobbles but to the north, it appears to become more of a hard packed surface. This is the appropriate level to be the footing for the floor associated with the bottom of the stairs excavated in 1994. A ceramic vessel was found in pieces lying on the surface of the floor, which was identified as Late Roman A ware.

20. And is the same type of floor/footing uncovered in the Pronaos (Trench 23), although not as well preserved. Here there were important bone remains, metal finds, and charcoal in ash lenses which have been sampled. This sealed deposit may provide the first secure chronological evidence for the structure.



south wall of fallen and robbed stones. There was no evidence of mortar between these stones as well, instead fill and small stones bonded its elements together. It was constructed on a layer of abandonment between the column and the engaged column on top of the Stylobate.

This season's Phase VIIa excavations have shed little light on either the purpose or multiple reuses of the West Exedra. Excavation of the later fills indicated at least three different phases before primary contexts were reached — a series of modern and early modern fills, fills associated with burning, and early/ancient fills, with more homogeneous artifactual assemblages directly above the primary contexts. No architecture, slag, or other debris associated with kilns or ovens was found, nor was there irrefutable domestic/occupation evidence. The fine thick dark gray ash deposit of 0.85m in depth was centered in the West Exedra. The reason for this deposit still is unclear. There was no strong evidence supporting any theory about its origins, what was being fired, and whether the ash layers spread throughout a large area of the Lower Temenos were in any way connected.<sup>21</sup> Within this ash layer there was a great diversity of artifacts — a large amount of pottery including two lamp fragments, random concentrations of bone, glass,

fluted plaster, as well as capital fragments including three elephant trunks.<sup>22</sup> The dating of these artifacts was mixed and ranged from pre-Byzantine to modern. The questions still remain — what was being burned here, and for what reason?

On the whole, the usefulness of the later Phase VIII fill layers in contributing to an understanding of the West Exedra area may be limited. These were comprised of large amounts of rubble — small irregular stones with very little soil matrix, plaster, and very large ashlar with one curved face, presumably collapse from the West Exedra wall. Little pottery was contained in this deposit. Later in this phase was the accumulation of topsoil which has been contaminated by its exposure.<sup>23</sup>

While much was accomplished in 1995 to define the form and relative chronology of the West Exedra, evidence concerning function and absolute chronology was scarce indeed. While coins in the pebble fill and pottery from under floor beddings might reveal much as to the dates of its construction, their context was disturbed. As for function, there was no real evidence pertaining to this aspect of the West Exedra.

Now we turn to the Lower Temenos East, its East Colonnade, and the newly discovered structure lying below.

21. I posit the area served as a kiln. There was a large concentration of ridged roof tiles found which may have been used to support the walls or roof of a kiln. The eastern entry column has been burned and scorched and more eroded at this level than the rest of the column. It is possible that the column was used as a firing column for a kiln. The only other evidence that might suggest repeated firing is the large amounts of olive pits found on the eastern edge of the ash layer. We assume that firing took place in the West Exedra; its heavy concentration does not appear to have fallen in from the Upper Temenos above.

22. Many other carved limestone fragments including elephant ears, cheek-pieces, and trunks have also been identified and registered as having come from the Lower Temenos, which sug-

gests that this may have been the place of this decorative capital's origin.

23. The main suggestion is for further excavation outside the Exedra wall. Excavation immediately east of the West Exedra wall would probably reveal the relationship of the West Exedra to the 'Grand Stairway.' Excavation south of the apse wall might determine the nature of the southern fill-in wall/repair and the relationship between the apse and Upper Temenos, and north of the current northern limits to understand the West Exedra's relationship to the double colonnade and the Lower Temenos plaza. A deeper probe within the West Exedra will enable us to find the foundation level of its wall. Finally, removing the (Byzantine ?) platform would be interesting to see what is built into its foundations; it would also reveal the original structure.

**Lower Temenos East Colonnade (Fig. 8)**

The archaeological investigation of the Lower Temenos East was undertaken in Trenches 14,<sup>24</sup> 20, 17,<sup>25</sup> in addition to several Special Projects. It was concluded that there were four major construction phases here, represented by the earliest, Phase I, a north-south wall with arch springers; then a Phase Vd remodeling of two east-west retaining walls, E-W Wall N and E-W Wall S; after which the area was filled in and became the support for the construction of the Stylobate; In Phase Ve, there was the installation of the hexagonal pavement. In Phase VIII, the area served multiple reuses as a dump, an industrial complex, and finally in Phase IX as a farmer's field.

In the Phase I original construction of the Lower Temenos,<sup>26</sup> 2.10 m directly below the colonnaded East Stylobate, was a north-

south wall with limestone diagonally dressed ashlar mortared together and plastered. Built into this wall were arch springers 0.56 meters in width projecting some 0.22m to 0.28m from the wall face. The top elevation of these springers was 878.05m (thus they rested some 0.94m below the Stylobate level), and they were set approximately 1.40m apart. This wall with its east and west arch springers was constructed in a distinct style suggesting that it is the earliest architectural feature of the Lower Temenos. It must have served the Temple Precinct until it was filled in and the Phase Vd Stylobate and its Double Colonnade were constructed above it. Although two test trenches were excavated the bottom elevation is unknown and the exact purpose of this wall also remains a mystery. This leads us to speculate that there may have been an earlier Nab-



8. Lower Temenos Colonnade looking southwest (Photograph by A. A. W. Joukowsky).

24. With Special Projects 22, SP 24. SP 27 -29 involved column drum searches.

25. And Special Projects SP 25 and SP 38.

26. From the 1994 evidence, we assumed the hexagonal pavers to be constructed on fill, and we were correct, but we didn't suspect that the fill

overlay a massive construction of arches that had been built 6m below the hexagonal court! This indicates the Lower Temenos had an earlier monumental construction phase, which we have tentatively assigned to Phase I.

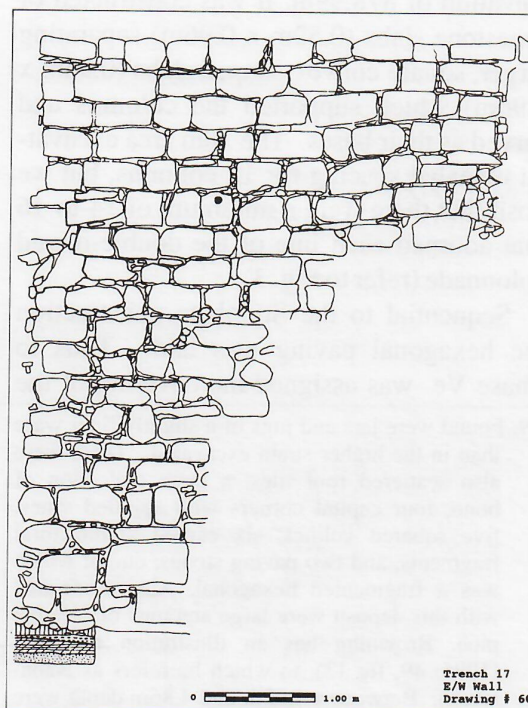
ataean access to the Temple's Lower Temenos from the Street area — not the Propylaea Steps which serve as the present day Temple access.

In Phase Vd the Lower Temenos was constructed. This was a time of major rebuilding for east-west walls were erected both in the north, E-W Wall N (Figs. 9 and 10), and south, E-W Wall S. We presume that the purpose of these walls was to provide extra structural support for the Stylobate and serve



9. Lower Temenos E-W Wall N sondage with N-S wall with arch springers, looking south (Photograph by A. A. W. Joukowsky).

as retaining walls for the fill and build-up against the Phase I North-South Wall with arch springers.<sup>27</sup> The depth of E-W Wall N was determined by a Trench 17 sondage.<sup>28</sup> At a 873.52m elevation, an 0.80m x 0.50m sondage was excavated to determine the depth of the North-South Wall and E-W Wall N in Trench 17. E-W Wall N was found to have been constructed on a layer of rubble. At a depth of 3.86m the evidence suggested that the fill was intentionally brought



10. Lower Temenos E-W Wall N section (Drawn by L. Payne, Drafted by A. H. Bedewy).

27. The 19 course E-W Wall N opened at 879.07m and closed at 873.67m elevation (5.40m in height). It is 4.43m in length by 2.10m in width, and was built on a level of rubble sandwiched between layers of compressed soil. The top course of this wall overlaps the East and thus post-dates it. The top courses consist of medium sized, rounded sandstones packed in an irregular pattern in a hard mud-mortar. The north face, however, exhibits careful construction technique with a facing of headers and stretchers with neatly packed fill in between them. The average size of the ashlar are 0.31m x 0.28 m (headers) and 0.52 x 0.27 m (stretchers). The majority are diagonally dressed, all from top right to bottom

left. Chinking stones are prevalent, and some ashlar we presume were re-used and were found plastered and decorated with blue and yellow painted stripes.

28. The base of E-W Wall S in Trenches 14 and 20 was not located. Further investigations will answer questions concerning the depth of deposit below the base of the East wall. The test trenches are designed to enable work to continue for quite some depth, but excavations here were very labor-intensive. It would, however, be interesting to see if the bottom of the wall would reveal a floor and help us understand the original purpose of these walls.

in to serve as support for a new scheme of rebuilding the Lower Temenos.<sup>29</sup>

Another two subphases included the east and west Stylobate construction for the Double Colonnades of the Lower Temenos. The Stylobate foundation wall indicated two phases of construction; an earlier of close fitting Nabataean dressed blocks, and a later of coarse blocks with a thick mud mortar and stone fill.<sup>30</sup> Covered by topsoil in Trench 17, the east Stylobate was revealed at an opening elevation of 878.99m. It was constructed of limestone slabs (0.52m x 0.96m) separating larger, square convex-shaped slabs (0.96m x 0.96m) which supported the columns and served as their bases. The 30m area excavated revealed spacing for 12 columns, but we posit that there were a minimum of 14-to-16 that adorned each line of the double-rowed colonnade (refer to Fig. 3).

Sequential to the Stylobate construction the hexagonal paving was laid. Thus to Phase Ve was assigned the covering of the

Lower Temenos with large hexagonal pavers. These pavers were the eastern perimeter of the hexagonal pavement which extended from the east across to the West Exedra and its Double Colonnade. Set into a complete paver was an hexagonally shaped drain (Fig. 11), 0.28m to a side with a central hole of 0.12m in diameter serving as the evacuation point.<sup>31</sup>

The earliest deposition in Phase VIII<sup>32</sup>



11. Lower Temenos hexagonal pavement with drain, looking east (Photograph by A. A. W. Joukowsky).

29. Found were jars and jugs of a slightly finer ware than in the higher strata excavated. There were also scattered roof tiles, a large collection of bone, four capital corners with spiraled vines, five squared volutes, six carved architectural fragments, and two paving stones, one of which was a fragmented hexagonal. Also associated with this deposit were large amounts of ceramic pipe. Browning has an illustration of pipes (1995: 49, fig 13), to which he refers as Nabataean). Between a 4.62m and 4.86m depth were 294 roof tiles, more jar and jug forms as well as scattered fine ware bowl fragments, 52 bones, and three small Attic bases (0.42 m diameter) and two small column drums (0.34m diam.). At 4.86m in a layer of compacted coarse sand were three yellow and red painted plaster pieces and 17 bones. At this depth a change was made in loci because of the discovery of sink holes suggesting that other architectural features might underlie the deposit. Here were recovered 89 roof tiles, five fragments of red plaster, and a small collection of ceramics varying from large storage vessels to Nabataean small forms, and 35 bones. In a 1.00m extension to the north there were 58 roof tiles, 25 fluted column pieces, and seven painted plaster pieces; as well as a small Attic base and carved decorative pieces. At 5.17m depth there was an abundance of painted red, yellow and black plaster, 243 roof tiles mainly

jar and jug forms, and cooking pots often with off-white or red slips, seven Nabataean painted sherds, and two small pine cones from a capital.

30. The upper course is composed of two rows of limestone and sandstone blocks, between 0.30m-by-0.30m and 0.20m-by-0.20m. The lower courses are composed of roughly hewn headers and stretchers. The stretchers average 0.60m-by-1.00m; the headers average 0.50-by- 0.50m. They are set in a rough mud mortar with stone inserts.

31. As noted above, an identical drain was found in the West Exedra which still contained a bronze sleeve set into the smaller hexagonal cutting.

32. Possible Construction Phase VIII - In Trench 17, an additional North Wall was unearthed at 879.02m, extending between the East and West Stylobates. It varies from the construction techniques used in earlier construction phases. This wall measures 0.37m x 4.20m and was excavated to a depth of 0.72m. Only the top two courses of this wall have been excavated and these are constructed of diagonally dressed limestone blocks — the top course consists of what appear to be re-used sarcophagus blocks (0.36m x 1.20m) which have 0.04m holes in the top; the northern face is roughly dressed in a concave fashion. Too little of this wall has been excavated to determine how it should be phased, and its purpose is as yet unknown.

was a sediment layer overlaying a series of thin ash and sediment. The quantity of material culture suggests that this was a domestic dump predating the industrial use of the area. As it was the latest deposit in which carved architectural fragments were recovered, it raises the possibility that this may represent a level of reuse of the Double Colonnade. In later Phase VIII, the southeastern Lower Temenos functioned for manufacturing mortar. A thick lime layer sealed a hard packed surface that abutted the West and East Stylobates suggesting that the lime was stored here using the walls as a wind break. At some point the northeastern Lower Temenos was also reused in an effort that left behind a great deal of ash, kiln wasters, and pottery. Most plausibly this ash can be associated with the same sort of ash and lime levels found to its south.

The upper levels of the Lower Temenos East in Phase IX were used for farming. Comprised of overlaying layers of soil and rubble fill, there appeared to be a concentration of architectural fragments in the lower deposits, including the majority of elephant sculpted fragments along with a large number of miscellaneous carved architectural fragments. Column fragments and blocks show scarring from plows at a depth of 45 cm below the surface.<sup>33</sup>

In conclusion, the Lower Temenos has a complex stratigraphy. The ceramics associated with these phases have not been carefully re-examined. Nonetheless there are clear transitions in the pottery types represented as well as an assortment of identifiable diagnostic fragments that support the phasing presented. The Stylobate foundation wall, the east-west retaining walls and their related fills as described above follow the construction sequences associated with the building of the Lower Temenos.

We now turn to the results of the excavations of the 'Grand Stairway,' followed by

the 1995 excavations of the subterranean Canalization system.

### The 'Grand Stairway' (Fig. 12)

Initiated in 1994, in 1995 we completed the test excavation and surveyed and cleaned a portion of the Stairway bedding from the Upper Temenos to the Lower Temenos. The subdatum was fixed at 882.49m on the seventh step, and the trench was extended 5.6m north to ascertain the length of the Stairway and its east ashlar support wall. The Stairway itself measured 9.5m in length, and the hexagonal pavement at the foot of the retaining wall was 2.5m in width.

The tentative phasing for this area is problematic — this area represents four major phases of remodeling and use. Phase Va is the Stairway construction, Phase Ve is the in-



12. 'Grand Stairway' linking the Lower Temenos to the Upper Temenos (Photograph by A. A. W. Joukowsky).

33. According to local workmen, these fields were in use as late as the beginning of this century.

stallation of large hexagonal pavers; Phase VIa represents the earthquake destruction, and Phase VIb Temple reconstruction — the steps are filled in and used as support for the Upper Temenos, with the construction of a monumental white limestone north retaining wall with its curbstones. These phases can be described as follows:

At an 882.48m elevation, a four course ashlar east wall of stepped limestone ashlar was constructed in Phase Va at the edge of the Temple Forecourt to the east. The wall blocks were of Nabataean construction, hewn, dressed diagonally and mortared in place. (In the lower wall level were two rows that have so far been uncovered, but there are presumably further rows that remain buried.)<sup>34</sup> Laid against the east ashlar wall was the stair bedding consisting of friable sandstone slabs with a mortar coating. Eleven steps were excavated down to their leveling stones, and of these five (Nos. 13-17), were totally covered with mortar. In the surrounding soil were large amounts of mortar and molded plaster — some of which was red. As the step bedding mortar was presumably used as an adhesive, the actual steps must have been robbed of their treads.<sup>35</sup>

Extending to the north into Trench 6 (1994) at 879.21m elevation, was a section of damaged hexagonal pavement assigned to Phase Ve. Recovered artifacts included roof tiles and mortar, indicating a possible roof collapse. An elephant trunk fragment was also found in this deposit, and lying on the floor and providing its terminus ante quem were two datable artifacts — a Minimus coin, and a Nabataean lamp fragment with a first - second CE date<sup>36</sup> — obviously, the

pavers were laid before the coin and lamp fragment were discarded, that is in ca. the first or second century CE.

The Phase VIa earthquakes rocked the columns and capitals that tumbled down from the Upper Temenos — their fragments and other detritus were buried in this fill. Overlying the stair bedding at 882.78m elevation was a brown, loose sandy soil, filled with mortar, and 38 architectural fragments — acanthus fragments, pomegranates, cornices, tendrils, pine cones — and pottery, including 23 Nabataean fragments.

A change in soil consistency was noted while excavating the second course of ashlar at an 880.71m elevation. Significant amounts of cultural material unearthed included Nabataean forms as well as jar and jug fragments, along with 23 carved architectural fragments, and a capital fragment of a limestone elephant head (Fig. 13).<sup>37</sup>

At 880.18m in a brown compacted silty soil mixed with charcoal, molded plaster, broken ashlar and many architectural fragments from fallen capitals, there was a large assortment of Nabataean pottery with one small piece of Islamic green tin-glazed ware, plus assorted body sherds of indeterminate origin. Architectural fragments numbered 10 with the most outstanding being two limestone capitals — finely decorated with vines — plus yet another limestone elephant trunk fragment.

After the earthquake in Phase VIc the temple appears to have undergone a rebuilding program, and many datable artifacts indicated its later re-use. Between an opening depth of 880.97m and a closing depth of 879.30m, the Stairway was found to end

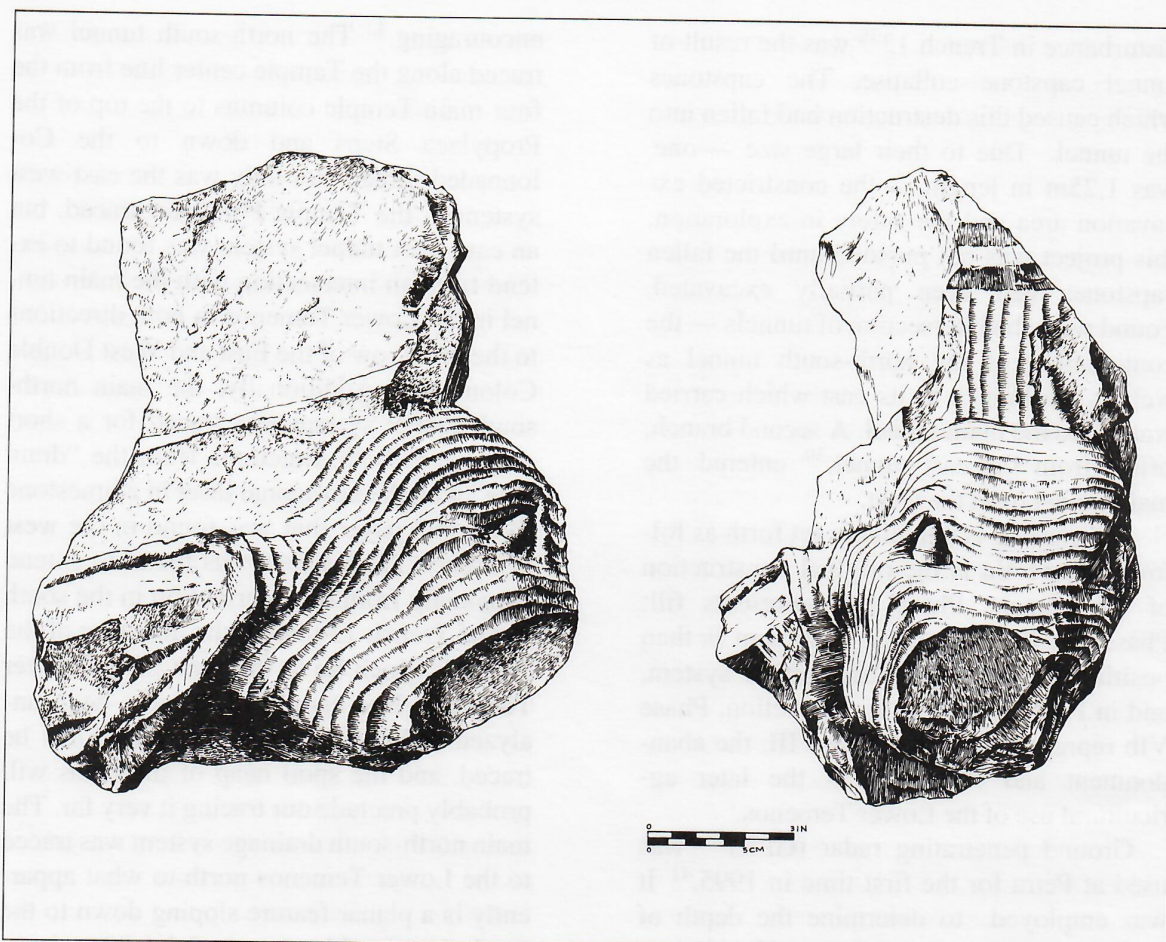
34. Step elevations from S to N. Steps 1-6 excavated in 1994; 7th: 882.49m; 8th: 882.31m; 9th: 882.12m; 10th: 881.91m; 11th: 881.77m; 12th: 881.60m; 13th: 881.41m; 14th: 881.21m; 15th: 881.06m; 16th: 880.88m; 17th: 880.71m.

35. Some of the steps have red plaster coating their risers, which may indicate that the facing of the steps was not covered by stone. Cultural material included some 15 Nabataean fragments, 60

sherds of indeterminate origin, and carved architectural fragments.

36. Amr, K. 1978. *The Pottery from Petra*. BAR International Series 324: pl.13, type 2.

37. Catalog no. 95-S-16, measurement L. 28.9cm x W. 29.6 cm. Present is the right ear, two eyes, one with its eyeball, and forehead. Another elephant trunk fragment was found in the same area as the head.



13. Elephant-headed capital fragment (Drawn by L. Sisson, Drafted by J. Blackburn).

abruptly on the north being blocked by a four course wall of large white mortared sandstone blocks. This wall cut off the stairs and was positioned over the Hexagonal Pavement. In front of the wall was a row of curbstones — one course of three hewn blocks mortared into place. It was assumed to have served as a gutter for water drainage for it was bonded to the wall by a plastered channel. At this writing it is unknown if the Stairway descends behind the intrusive wall down to the level of the pavement or, in fact, continues under the pavement, which would then fix the later date for the Hexagonal Pavement. The purpose of this wall is a matter of speculation, but it may have been placed on the pavement to block the staircase and provide a retaining wall for fill, which

then was built up to support the Temple Forecourt pavement (elevation 884.33m).

There then appears to have been an abandonment of the temple with little or no evidence for further use. During the subsequent centuries, silt and sand covered the earthquake detritus and formed the topsoil layers we see today, which almost completely enveloped the Temple architecture. It is hoped that further seasons of excavation will help us understand even more clearly the sequencing of events and transitions that occurred during the first centuries of this millennium.

#### **Canalization System and Ground Penetrating Radar**

In 1995 it was discovered that the paver

disturbance in Trench 13<sup>38</sup> was the result of tunnel capstone collapse. The capstones which caused this destruction had fallen into the tunnel. Due to their large size — one was 1.25m in length — the constricted excavation area and the safety in exploration, this project was not pursued until the fallen capstones had been partially excavated. Found were the intersection of tunnels — the continuation of the north-south tunnel as well as the branch to its east which carried water into the main tunnel. A second branch, offset from the east tunnel,<sup>39</sup> entered the main tunnel from the west.

The phasing is tentatively set forth as follows: Phase Va is the original construction of the tunnels, Phase Vd represents fill; Phase Ve, the Hexagonal Pavement is then positioned above the Canalization system, and in Phase VIa there is destruction. Phase VIb represents repair; Phase VIII, the abandonment and Phase IX is the later agricultural use of the Lower Temenos.

Ground penetrating radar (GPR)<sup>40</sup> was used at Petra for the first time in 1995.<sup>41</sup> It was employed to determine the depth of Temple deposits to discover if any unexpected features existed below the surface and to trace the extent of the underground tunnel system. The preliminary results are

encouraging.<sup>42</sup> The north-south tunnel was traced along the Temple center line from the four main Temple columns to the top of the Propylaea Steps and down to the Colonnaded Street. Not only was the east-west system in the Temple Forecourt traced, but an east-west tunnel system was found to extend from an intersection with the main tunnel in the Lower Temenos in both directions to the inner row of the East and West Double Colonnades. Additionally, the main north-south tunnel system was traced for a short distance in both directions from the “drain hole” with the hexagonal inset in a limestone hexagonal paver that was found in the west of Trench 17. A tunnel was found to extend diagonally from the intersection in the south end of Trench 13 toward the direction of the “baths,” which lie to the west of the Lower Temenos. Not enough data have been analyzed to know how far this tunnel can be traced, and the spoil heap of the baths will probably preclude our tracing it very far. The main north-south drainage system was traced to the Lower Temenos north to what apparently is a planar feature sloping down to the south that should appear at 0.5-1.00m elevation near the top of the Propylaea steps. It dramatically dips to a depth of 5-6m, and attains this depth about 7.5m south of its most

38. Trench 13, a 10m x 10m trench, was excavated during the 1994. In south balk of Trench 13 there was a disturbance consisting of a mound of rubble overlying a dislodged hexagonal paver which was visible at the bottom of the 0.44m hole under the floor. Because it was in-line with the north-south canalization tunnel, it was reasoned that this disturbance was the result of the collapse of a tunnel capstone which undermined the floor and caused its cave-in. Found on the last day of the 1994 excavation season, the area was covered with metal roofing, the trench was backfilled and the questions were left for 1995, Special Project 20.

39. If this second branch were offset to the north it could account from the floor damage visible in the southeast corner of Trench 13.

40. Ground penetrating radar sends a bipolar radar pulse downward and listens to its reflections from features below the ground. The strength

and character of the reflection depends on the contrast between the dielectric properties of the materials, namely their ability to become charged. The contrast between air and rock or soil is sufficient and we expected to be able to locate the tunnels, which we were successful in doing. We started making surveys over known tunnels to learn how they would show up and then made parallel adjacent traverses to follow them. We found that at some locations the tunnel did not show up, or did not show up well, because we assumed they were completely or partially collapsed at those locations. We also made profiles across known locations of rock walls buried in rubbly loose sand and were able to see a signal from the walls as well.

41. This was undertaken by T. Tullis, Department of Geological Sciences, Brown University.

42. At the south end of Trench 13.



shallow point. Excavation will confirm this feature.

Additionally the Colonnaded Street was documented by GPR, and the area where blocks are slightly askew and sunken on the street surface is where we project the canalization system coursed. We therefore project that at least part of the system, perhaps the overflow, extended north under the Propylaea Steps, coursed under the Colonnaded Street and discharged into the WādiMūsā.

There was also an investigation the so-called "bath" system adjacent to the Southern Temple,<sup>43</sup> to search for hoped-for connections between it and the Lower Temenos. The results were inconclusive, but we may have discovered an additional room that as far as we know does not appear on any of the present plans of the complex.

### The Southern Temple

The Southern Temple is tetrastyle in antis — four columns at the front with the central columns spaced at 7m and the two end columns at 5m to the east and west respectively. The columns alone stood 15m, and in addition with the triangular pediment and entablature — the temple height would have been approximately 19m. The Temple measures, 28m east-west and 40m north-south. It has a Forecourt of hexagonal pavers. First we will describe the Upper Temenos east Temple exterior and its features.

### The East Temple Exterior (Fig. 14)

Special Project 30 delineated the East Podium, and Trench 19 explored the possibility of an East Walkway.<sup>44</sup> The phases of these deposits were as follows: Phase Vb appeared to be the earliest construction when a north-south wall, (hereafter, the N-S L5 wall), was built and yet another conduit of the subterranean canalization system was defined.

In Phase Vd the Temple Podium and Stylobate were realized. Built in Phase Ve was the stairway access to the East Walkway and the small hexagonal pavers in the Temple Forecourt were laid. After Phase VIa when remodeling took place, in Phase VIIa, there was the installation of a drainage system with ceramic pipes placed on top of the pavers of the Temple Forecourt. In Phase VIIc there may have been repair, and a restuccoing of the east exterior Anta wall. This was followed by another destruction, and finally in Phase IX there was abandonment.

Phase Vb was the earliest phase of the site's history to have been excavated in the Temple East. Constructed parallel to the Podium the L-S L5 wall opened at an 885.97m elevation, and its depth was registered at an 884.46m elevation. On the west it was well-constructed with large hewn ashlar, however, its east face consisted of small horizontal stones, and was probably rebuilt at some later time. If there was a northern extension to this wall, it lies under fallen column collapse. The west face of the N-S L5 wall and the canalization indicate a Nabataean or Roman origin for this installation.

At elevations of 884.46m and 883.09m, just east of the stairs, the underground canalization was discovered extending north-south with an northerly descent and a slight northeasterly curve (Fig.15). Slightly askew hewn capstones were found at 884.46m, indicating that they had been moved in antiquity perhaps to repair or clean the system. The tunnel walls consisted of three course dressed sandstone ashlar, covered by a 4cm thick mortar. The depth of the tunnel was 1.20m, and its floor width measured 0.63m. Its approximate length was 12m. We assume that this tunnel served as an eastern artery for the main subterranean Canalization system, but the area excavated, unfortunately, was

43. Special Project 21 — the results will be documented by J. Rucker, N. Clapp and myself.

44. SP 30 was a right angle trench delimited by column fall. Its dimensions were 7.20m E-W by

4.60m N-S with a hypotenuse of 8.20m. To its south is Trench 19 which lies east of Trench 4 excavated in 1993 — with dimensions of 5.20m N-S by 3.40m E-W.



14. Aerial photograph of the Upper Temenos, Southern Temple and Adyton, looking south (Photograph by A. A. W. Joukowsky).

too narrow to permit a deep probe to confirm a connection between them.

To Phase Vd was assigned the construction of the Temple Podium, Stylobate and their foundation wall. Built just before the podium itself was a four course foundation comprised of large ashlars. The Temple Stylobate was constructed at an 884.98m elevation (its areal dimensions in this trench were 2.95m in length by 0.79m in width); its surface exhibited deeply cut tool marks. Interstices between the blocks were filled with small stones and a gray mortar mixed with what appeared to be ash. A number of these Stylobate blocks were removed and then replaced in antiquity.

45. It might be that the Podium is contemporary to the north-south L5 wall, but it also could be reasoned to be later. Similarly, it may be that the stairs are later than both wall and Podium. The date of the building of the Hexagonal Pavement remains unclear. There is no evidence of a con-

In Phase Ve, between the elevations of 885.40m and 884.45m, were six sandstone steps for forecourt access to the eastern walkway. These stairs were placed between N-S L5 wall and the podium.<sup>45</sup> The stairway measured 2.40m north-south by east-west 2.00m — each step was comprised of two ashlars. Resting on two flat limestone flagstones that abutted the small hexagonal pavement of the Temple Forecourt, the step bedding was comprised of an intentional footing of red sand, a hard layer of mixed sand and clay, and directly beneath the pavement were small flat leveling stones and a layer of a hard “yellow” sandy pebble bedding.<sup>46</sup>

There was no evidence of bonding be-

temporary installation, nor of a later one. It may be possible that the Pavement and the stairs were constructed together.

46. This appears to have been a secondary bedding after the reinstallation of the pavement.



15. East Walkway with Canalization, Temple Podium and Stylobate, looking west (Photograph by A. A. W. Joukowsky).

tween either the stairs and the wall to the east, or between the stairs and the Podium. At some point this bedding lost its structural integrity, and the stairs slightly slumped to the northeast. They may have been built by the Temple architects as an add-on afterthought. The small hexagonal pavement of the Temple Forecourt in this limited area measured only 3.70m by 2.50m. Two pavers had been recut in the eastern limit of the pavement and they were not well aligned with N-S L5 wall in the southeast corner.

Phase VIa marked the destruction of the Southern Temple. The following phase, Phase VIb, was attributed to some sort of repair to the Canalization. In this sector measuring 0.50m by 0.36m, there was the re-

moval in antiquity of the southeast corner of the pavers, after which, they were relaid. The ceramics indicated that this intervention may not have been later than the Roman period, and may have been even earlier. This phase was also the best candidate for the latest possible rebuilding of the N-S L5 wall.

In Phase VIIa north of the podium, was the installation of an east-west ceramic pipe canalization encased in a gray/white mortar protected by flat small reused stones. The drain opening elevation was at 884.77m and it closed at 884.57m. In their positioning of the above-the-ground canalization on the pavement, these later architects partially destroyed the N-S L5 wall. The drain was sloped from east to west — its dimensions measured 5.20m in length by 0.20m in width — each pipe segment was 0.20m in length with an average diameter of 0.10m. There were two fills inside it — a loose lower sediment layer with a silty-muddy layer on top. With limited material remains we have tentatively assigned this phase to the Late Roman or Byzantine period.

In Phase VIIc the Southern Temple was destroyed and the exterior East Anta collapsed. Here many carved architectural fragments were recovered.<sup>47</sup> Phase VIII was also a collapse layer of coarse earth mixed with ashlar and architectural fragments. In the destruction of the N-S L5 wall, Nabataean and Roman lamps were found. Thereafter in Phase IX is abandonment, represented by one major layer of sediment and erosion which overlies general destruction. This seems to be a natural erosion deposit washing down the slope from the south. The top elevation of this overburden was 886.32m and its lower elevation was 885.98m — it completely covered the area. There was no trace of further occupation.<sup>48</sup>

Among many cogent questions remaining

47. A sizable wall, 3.70m by 0.80m, in the east was constructed using carved capital elements from the Temple collapse. Assigned to this phase, it will not be described until more is known about

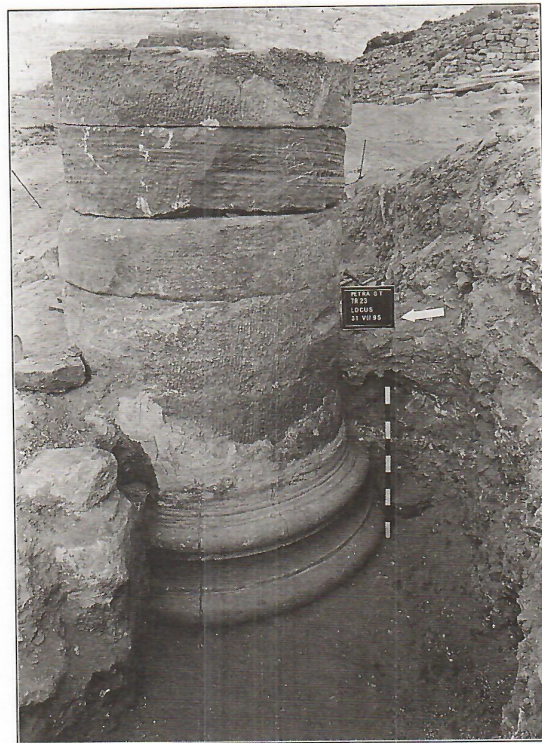
its nature.  
48. At some later time a large pit was excavated both into this layer and the layer of collapse underneath it.

about these deposits concern the origin the subterranean canalization system extension and its role in draining water from the Temple. The dating of the different phases of this area is problematic.

### The Temple Pronaos<sup>49</sup>

The phasing of the Pronaos deposits can be outlined as follows: Phase Vc was the erection of the east and west Pronaos Antae and the interior Pronaos Columns. Phase Vd the Temple Stylobate and the four Stylobate Columns were erected and the Pronaos floor bedding was laid. There was destruction in Phase VIa, and in Phase VIb the Pronaos floor was robbed. In Phase VIc an east-west wall with a doorway and platform were built up to the interior Pronaos Columns and the West Anta, and in Phase VIIa the Phase VIc east-west door was blocked. Following in Phase VIIb, the Temple Pronaos was used for refuse and in Phase VIIc it was abandoned. Phase VIII was the final collapse, and Phase IX marks the final abandonment of the structure. A discussion of the phases follows.

In Phase Vc the Pronaos plan was clarified. Resting on finely carved Attic bases were massive interior temple columns (Fig. 16) which we have identified with the original Temple construction.<sup>50</sup> Both sandstone columns were supported by well-preserved limestone Attic bases, 2.10m in diameter, carved in two pieces and perfectly preserved to a 0.70m height.<sup>51</sup> The Attic bases rested on leveling blocks, and their elevation confirmed the Pronaos was at the same elevation as the Stylobate. The West Pronaos column's top elevation was 888.64m and its founding



16. Pronaos West Column, looking east (Photograph by A. A. W. Joukowsky).

elevation, 886.00m.<sup>52</sup> Traces of white and red stucco up to 11cm in thickness still adhered to the lower diagonally dressed column shafts.

The upper course of the massive east 2.50 meter wide Anta wall<sup>53</sup> was cleared, but completely excavated was its twin, the interior West Anta<sup>54</sup> (Fig. 17); which was found at a 888.70m elevation. This well-constructed wall rested on a limestone base similar to the Attic profile of the columns. Measuring 1.50m square, its projection to the south was 1.20m in width, its west face was flush with the west face of the Anta and its east face inset 0.30m. Exposed along its

49. Trench 23 measured 10m north-south by 6.5m east-west. SP 23 was 3.1m north-south by 3.6m east-west

50. The interior eastern column's second drum had an elevation of 887.68m. Its founding elevation was 886.00m (bottom of base) — it was recovered standing to a 1.68m height. Two dressed sandstone drums, height 0.50m and 0.48m., diam. 1.50m stood on its well-preserved Attic base.

51. The profile of the base is identical to that of the

bases of the front columns, as are its dimensions. The base is preserved in very good condition, unlike the weathered bases of the exposed front columns.

52. On these drums two more drums have been re-erected — the reconstructed height is 2.64m.

53. This was left unexcavated in 1995.

54. The north face was uncovered in Trench 12, 1994.

2.10m north-south length, its maximum preserved height was 2.86m above the surface of Pronaos floor bedding. Fine white mortar was still visible on this feature's exterior.

The Phase Vd Stylobate<sup>55</sup> consisted of well preserved white rectangular sandstone blocks with an average elevation of 886.07m. The front four Temple columns were also erected during this phase. The Pronaos floor bedding (for the robbed flooring) rested some 28cm below the level of the Stylobate, and 16cm below the foundation of the West Pronaos column and West Anta.<sup>56</sup> At 885.07m elevation this bedding of irregular sandstone slabs, (20-15cm in length and width) was built up to the column base, however, it was built over at a later time making its limits difficult to determine.<sup>57</sup>

In Phase VIa, presumably after a lengthy period of use, the Temple suffered a catastrophic destruction after which the Pronaos was still in use but its character dramatically changed. Thereafter the Phase VIb remains suggest abandonment for there was a layer of sterile soil, ranging from 885.98m to 886.04m elevation upon which the next occupation level rested. It seems that at this time the Pronaos pavement was robbed.

In Phase VIc there was evidence for a dump, rather than an occupation level, perhaps deposited before newcomers rebuilt, or it could have been fill deposited by later builders. Overlying the floor bedding was an east-west wall 7.30m in length. Built across the south Pronaos, its west end abutted the northeast corner of the West Pronaos column and the West Anta, and in the east it extended into the east balk. Its average eleva-



17. Pronaos West Anta (Photograph by A. A. W. Joukowsky).

tion was 886.57m, its maximum preserved height was 1.30m, and its width was 1.28m. Composed of hewn and unhewn sandstone blocks, ca. 0.30m-0.50m in length, a few re-used ashlar (the only dressed stones), were set into a mud mortar to form a division wall, not a load-bearing wall, for where it abutted the northwest face of the West Pronaos column, it preserved the column's red plaster decoration. A doorway, (now filled) 1.42m wide originally pierced the wall 2.0m from its west end.

Bonded to the east-west wall to its south, and extending into the south and east balks was a "platform" structure composed of

55. The Stylobate and the front Stylobate columns were uncovered in the 1993 field season.

56. Within the bedding in the northeast Pronaos were uncovered three suspicious-looking sandstone blocks, laid in a slightly oblique north-south line. They resemble the canalization capstones, but they seem to be too far west to be in line with the south tunnel of the main canalization system. Small sink-holes (one slightly over 1m in depth) suggest, however, a canal-

ization artery.

57. It is possible that this bedding is not original to the temple construction — if it might have been installed to support a later (not original) floor. Perhaps partial removal of this bedding in the future will help to determine its date. Its elevation is beneath the sandstone foundation block of the column, suggesting that it must be bedding, rather than pavement because otherwise this block would have been covered.

hewn and unhewn blocks, ca. 0.20m-0.80m in length, reused dressed ashlar and small stones. Its average elevation was at 886.85m, and its maximum preserved height was 1.23m. The exposed east-west width was 2.20m, and the north width was 1.70m. This platform was poorly constructed — the interior was purposeful fill rather than laid stones.<sup>58</sup> On its southeast was a sandstone multicolored surface or pavement, which was built 1.38m to the southeastern edge of the column, as if it had been constructed around it. Extending from the east balk was a small projection, which may have been stairway leading up to the platform level. The purpose of both the wall and platform were unclear. They may represent the raising of the Cella floor level.

Phase VIIa was assigned to the doorway blockage of hewn and unhewn sandstone blocks, small rocks, and a great deal of mud mortar. Its average elevation was 886.50m and it bonded with a “pedestal” composed of hewn sandstone blocks, small rocks, and mud mortar built into the east-west wall. This feature was not carefully laid, with the exception of a single large 0.98m x 0.40m ashlar which formed its north face. The doorway blockage and the pedestal must be contemporary. Once these features were installed, access to the area south of the east-west wall would have been limited, if not completely cut off.

Phase VIIb was a late one meter thick deposition comprised of erosion remains or abandonment. Phase VIIc was a fill of loose and coarse soil which opened at 886.75m and closed at 885.83m. It appeared to have been an intentional dumping of waste, including a large amounts of pottery and bone. The pottery consisted of a variety of types, from cook pots and jars (few large storage vessel fragments) to a fair amount of fine ware — late Nabataean wares, including a squat one-handled juglet, and bowl frag-

ments. Roof tiles were scattered throughout this fill, with a heavy concentration in one 0.50m square deposit, where they were associated with small clumps of ashy-gray mortar. Also found were painted plaster fragments, including some in red, green, yellow, blue, white, and black. A few pieces still carried designs, including one group with a green acanthus-type leaf with black veins on a red background. Hundreds of unburnt bone fragments ranging from small bird bones to large goat long bones were recovered — there were no visible cut-marks on their surfaces.

There was then evidence for a brief (?) Phase VIId abandonment before the Temple collapse consisting of a thin layer (between elevations of 887.03m and 886.95m) of clean fill which overlay the floor bedding and the platform level. Unlike the destruction debris layer, this deposit contained few architectural fragments. Yet another fill extending from 885.95m to 885.79m was of relatively clean fine soil just under the destruction phase. It contained small amounts of pottery, bone, glass and metal, and 344 white limestone tesserae, a few still joined with thick off-white mortar, but there were no carved architectural fragments. The pottery was a fairly churned-up random mix, including one large *Terra Sigillata* bowl base fragment.

Phases VIII and IX were the major destruction and final abandonment of the Temple. This phase of the Temple's history was clearly in evidence in the heavy destruction debris layer found throughout the Pronaos, consisting of broken ashlar, over 150 carved architectural fragments, and virtually nothing else. Although much of this debris appeared to have fallen in a single episode of collapse — some this rubble probably also accumulated over time as any remaining architectural elements finally collapsed. At elevations from 887.60m to 887.03m, this de-

58. A limestone column base fragment has also been used as construction material.

posit was almost entirely comprised of plaster and stone tumble. The columns fell in this phase. The platform was also destroyed and its stones mixed with the rubble, making it difficult to excavate. Recovered were 200 plaster fragments of four different types — curved white, flat white, white and lipped and flat red. Their average size was 10cm x 5cm x 4cm. Some of the red fragments are 8cm in thickness. The gradual Temple collapse and erosion of Phase IX rested on top of the major destruction level between elevations 887.66m to 887.27m under a layer of topsoil debris.

In conclusion, the 1995 Pronaos excavation was an essential and informative project for gaining a better understanding of the Southern Temple layout and occupation phases. As we suspected, many of the original embellishments — flooring, columns and wall plaster — did not survive. But there is now ample evidence for later periods of Temple activity indicating that the building enjoyed a long history of occupation.

### **The Temple Adyton**

The Cella entry is marked by two columns which are 1.50m in diameter, but passing into the Cella, we note that they are larger than either the eight columns flanking the Cella walls or the six at the temple rear which have diameters of 1.20m. Yet to be excavated is the central portion of the Temple Cella, which together with the Adyton is some 29m north-south by 18m east-west. At this point we move south to the evidence from the Temple Adyton.

The Adyton was dominated by the remains of a large, central vault with constructions flanking it on each side that mirror each other — stepped arched passages led to paved platforms; and to the east and west of these respectively are twin north-south vaulted structures (Fig.18) which in turn were separated from parallel vaulted stairways with arched windows and doors, that descended and provided access to the Temple cella and/or exits.<sup>59</sup> They may have accessed the paved walkways on the structure's exterior. The goals for the Adyton included the excavation of: 1) the eastern (Trench 15) and western (Trench 22)<sup>60</sup> interior staircases; 2) the cella's intercolumnar walls; 3) the arches in the intercolumnar walls as doorways, windows or niches; and 4) the West Adyton vaulted area located to the east of the staircase between the western interior staircase east wall, and north of the major east-west wall.

The Adyton has several construction phases that may have been part of a single major construction plan, or represent separate additions due to an elaboration of the Temple and the need to improve the structural integrity of the building.<sup>61</sup> The most likely phasing scenario is that the columns, Phase Vd, belonged to the original Temple construction with the later addition in Phase Ve, of the cella's exterior intercolumnar walls and central vault. This construction was immediately followed in Phase VIa with the erection of the interior cella walls and the interior east and west staircases. (The completely excavated 11m long east Staircase is

59. In 1995 the vaulted eastern stairwell of Trench 15 was completely excavated.

60. The excavation of Trench 22 was not completed by the end of the 1995 season as a result of the combination of a great depth of the deposit above the floor level and the difficulty of moving its massive stone collapse.

61. All evidence points to a Nabataean date for at least the first three construction sub phases: diagonally dressed ashlar blocks set with mortar and chinking, and the plastering of architectural

features being the most supportive of this. Ceramics were minimal and limited to sherds in the fill/debris (increasing in number at levels closer to the floor surface); the vast majority was fine red ware, with many examples of the painted fine red ware as well as ridged storage jars all of which can be attributed to the Nabataean Period (the painted ware seems to be mostly of the Classical Nabataean style = first century CE).



18. Adyton West Stairway and West Vaulted Room, looking south (Photograph by A. A. W. Joukowsky).

shown in (Fig. 19). At a later date, in Phase VIb, there was the re-building of the upper courses the West Adyton as well as other interior walls. Phase VIIb was a period of abandonment with a level of clean fill just above the floor surface; Phases VIIc-VIIId were a series of destruction/collapses, the robbing out of floor pavers; the subsequent accumulation of fill and topsoil occurred in Phases VIII and IX. Each of these phases is briefly discussed with emphasis placed on the more completely excavated West Adyton.

In Phase Vd there was the erection of the columns, which represent the earliest phase of the Adyton's history. Constructed of hewn sandstone drums, these columns were originally covered with decorative (fluted) white or unfluted red plaster and adorned with limestone capitals elegantly carved with acanthus leaves, pomegranate flowers, pine cones and volutes. The extant decorative plaster found on the columns would not have



19. Adyton East Stairway, looking south (Photograph by A. A. W. Joukowsky).



been visible with the later Intercolumnar Walls built up around them — suggesting they were originally intended to be free-standing and viewed from all directions.

It is clear that the intercolumnar walls were constructed for support in Phase Ve between and around the columns — the masonry was, however, of Nabataean signature suggesting that the intercolumnar walls were part of a Nabataean reconstruction of the Temple. These walls were a casemate structure with a shell of regularly cut and diagonally dressed sandstone ashlar blocks, between which was a fill of small-to-medium-sized stone rubble. The southern exterior wall of the temple and the central vault within it were probably built in this phase.

The west intercolumnar wall extended north-south along the west side of the cella. Constructed of sandstone ashlars many of which were diagonally dressed, the top course was the lowest course of a vaulted ceiling with stones with concave faces. Under these was a course of triangular stones creating a sloped ceiling in line with the staircase below. On the south was a doorway leading from the top landing to the Temple west exterior. There were three arched openings in the exposed portion of this wall shown in Fig. 20: 1) the southernmost was

high up in the Staircase — an upper window; 2) the center arched opening was halfway down the Staircase — a lower window, and 3) the northernmost was an arched opening at the base of the Staircase — a doorway.<sup>62</sup> Windows were probably used to allow light into the Adyton which otherwise would have been dark. Other openings appeared to be tall and narrow doorways passing from the lower stair landing into the Adyton.

Walls divided the interior staircases<sup>63</sup> on the Adyton east and west from the inner East and West Adyton. Standing parallel to the Intercolumnar Wall was an interior north-south wall, N-S L22,<sup>64</sup> separating the interior West Staircase and the West Adyton. Its south face is the north wall of the upper landing; its northern extension was not completely excavated. Constructed of sandstone ashlars many of which were diagonally dressed, there were also two openings in this wall: 1) the southernmost, which was located halfway down the Staircase, was a window for the passage of light into the West Adyton from the window in the West Intercolumnar Wall; and 2) the northernmost, located at the bottom of the Staircase, was probably a door leading from the lower landing into the West Adyton. It appears that these interior walls and staircases were constructed after the cel-

62. Top elevations: East face is 891.84m (S); 890.30m — in the center, at greatest preserved height just south of the upper window; 889.46m — where the slope levels out north of the upper window. Bottom elevations: east face, 890.86m south; 887.70m center — at the greatest preserved height just south of the upper window which also corresponds to the top of the highest complete step along this wall face; 887.27m, center — the lowest excavated point below the upper window corresponds to the top of the lowest excavated step. Measurements: Height east face, 0.98m (3 1/2 courses at top landing); 2.6m (8 courses south of the upper window). Height west face, 0.85m; Length is 14.85m (doorway at the top of the Staircase to the south face of Column C4-A), and the width is 1.9m at the top landing, and 1.8m at the upper window.

63. The Western interior north-south staircase extends between the west intercolumnar wall and the in-

terior wall and connecting the bottom floor with the second story landing. It, like its twin on the east, is constructed of a bedding of irregular stone rubble and yellow clay and paved with rectangular sandstone pavers. Plaster was used as a mortar under the pavers. The pavers of the top eleven steps were completely robbed away in antiquity; only small pavers abutting the walls remain of the next three steps. The heavy stone debris from the collapsed columns prevented the robbing out of the large rectangular pavers of the lowest four excavated steps which remain in situ.

64. Top elevations 891.92m (S); Bottom elevations: 889.26m (center - west face at lowest excavated step). Measurements: Height (west face): 1.0m (3 courses at the top landing); 2.0m (6 courses at the 12th step down); (east face) is 2.13m (6 1/2 courses at the junction with Wall/Locus 43); Its length is 9.4m (from the south face to the north balk).



20. Adyton West Stairway with arched window and door, looking west (Photograph by A. A. W. Joukowsky).

la's exterior walls due to the fact that they abutted the exterior walls and were not bonded to them. The fact that these windows and doors were built into the intercolumnar wall suggests that Phases Ve and VIa were part of one major restructuring of the temple.

The top three courses of an east-west ashlar crosswall (E-W L6)<sup>65</sup> defined the northern extent of the lower landing of the west interior staircase. It was not bonded with either the west intercolumnar wall or with the interior north-south wall (Wall 47, *infra*), but was instead built up between the two in a later construction phase (Phase VIb). How much later this wall was constructed after Phase VIa remains unclear. It could have been the final step of an overall reconstruction of the temple and therefore contemporary with Phases Ve and VIa, or a later Roman - Byz-

antine addition that purposefully restricted access to the Staircase traffic from the West Cella.

*The West Adyton:* There was also an interior east-west wall, Wall 43, marking the subdivision of the West Adyton from the Central Vault — it supported the second floor landing. Its top elevation was 890.88m and its depth was at 886.08m. The height of its north face was 4.8m, and it was 1.2m in width. Constructed of sandstone ashlars except for three square blocks of limestone set into the center of the seventh course from the bottom, the lowest four courses were more regularly cut than those of the upper seven courses (many of which are badly eroded) — they may be of an earlier date.

Along the central axis of the Adyton was an interior north-south wall constructed of

65. Top elevations are 889.53m (NW), 889.44m (SW); The bottom elevations are 888.54m (at current ground level). Measurements: Height

(south face) are 0.9m (as currently revealed); West (south face) is 0.6m (as currently revealed) and its thickness is 1.5m (top ledge

sandstone ashlar, Wall 47. It was 5.1m in height and 5.1m in length; its elevation on the south-west was 890.09m and its floor rested at 886.08m. At its southernmost end where it was bonded with the north face of Wall 43, it stood eleven courses in height. Its uppermost course was of triangular stones which served as a foundation for a sloped vaulted ceiling similar to the one over the west interior staircase. Three courses of this vaulted ceiling were preserved.

Phase VIIb was a period of abandonment before the initial collapse of the Temple. It was represented by layer of clean fill with no large stone debris just above the undisturbed floors and steps. This hypothesis was further supported by a thick layer of clean fill above the lower stair pavers and the floor surface uncovered in the southeast corner of the West Adyton.

Phase VIIc was the collection of fill and debris within the Temple Cella. Other than the possible evidence for a Phase VIIb abandonment on the lower steps and in the corner of the West Adyton, this fill/debris was associated with the Temple collapse and later filtering in of sand over the last several centuries.

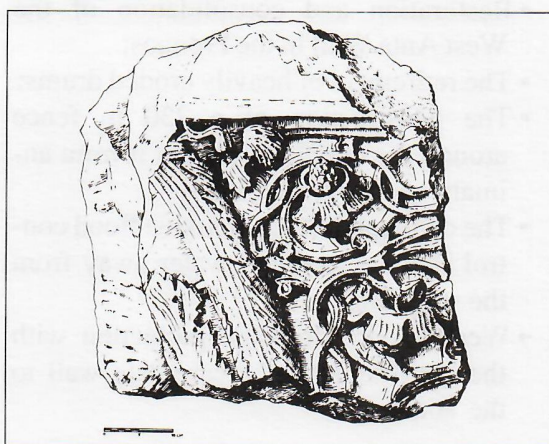
The west Temple columns collapsed to the east into the West Stairwell and West Adyton, which was congested with drums and finely sculpted capitals embellished with a profusion of fruits, flowers and vines (Figs. 21a and b). These elements were the best evidence for a singular episode of Adyton collapse — probably the initial episode. Narrowing down the date of this collapse may come from the discovery of three coins found above the step pavers sealed by collapsed drums and capitals — they were deposited before the collapse which predates the robbing of the remaining step pavers, and the subsequent collapse(s) that sealed the disturbed area of floors and steps. Subsequent to this was a long period of abandonment in which sand and additional debris filtered in and there was the accumulation of

topsoil. Overall this fill/debris consisted of ashlar, vaulted ceiling stones and columns, surrounded by sand, smaller stones, and carved architectural fragments. There were few potsherds, roof tiles and tesserae, although their numbers increased in the deposits just above the floor.

It still remains premature to speculate



21a. Capital fragment (Photograph by A. A. W. Joukowsky).



21b. Capital fragment (Drawing by J. Blackburn).

whether the Temple Adyton was a two or three level structure, but future excavations should provide us with a better understanding of this sector's architectural plan. Excavation has given us many answers for the construction of the Temple, but many problems remain to be solved.

### Conservation and Consolidation

The proper protection and conservation of each of the temple sectors has been a major responsibility of the current project. Ongoing since the inception of our work in 1993 has been the consolidation of its deteriorating blocks. At the outset we made preliminary trials for consolidating or replacing deteriorating masonry with a lime-mortar adhesive. This was a basic and important measure of site preservation and presentation. One of the site's most important consolidation efforts was the anastylosis of the lower curbing of the Propylaea Steps. Other such projects prioritized the Stylobate and Crepidoma of the temple facade. Other completed projects include:

- The removal and reinstallation of the east buttress in the West Exedra;
- The construction of steps (using ancient elements) at the Temple entry;
- The replacement of column drums with better preserved elements in the Temple facade and in the east Double Colonnade of the east Lower Temenos;
- Restoration and consolidation of the West Anta Wall in the Pronaos;
- The retirement of heavily eroded drums;
- The construction of a 230 m fence around the temple to protect it from animals and for tourist safety;
- The construction of a massive flood control channel to divert water away from the structure;
- West Exedra drainage protection with the construction of a casemate wall to the south;

- The backfilling of trenches so they are not exposed to air and water seepage during the rainy periods; and
- The protection of delicate areas by roofing them over with zinc sheeting held in place by sandbags.

Further projects are under consideration as our work progresses.

### The Catalog

Found in spolia in the grid bordering A1/a1, the most spectacular find of the 1995 season was the head of Tyche (Fortuna) wearing a turreted crown and merlon ornament, which must have been part of an architectural facade (Figs. 22a and b). Although she is sculpted in sandstone and is abraded, she is a clear indication of the Hellenistic tradition at Petra. She measures 38cm in height, 35cm in width and is 29cm in thickness. Her turreted crown has a central diadem which rests on her wavy hair which is parted in the middle. Her condition has been compromised — there is damage from surface salts, her left face is worn as are her eyes, she lacks her nose, and her serious almost pouting mouth is damaged on the left side; yet she exhibits full cheeks and a rounded chin.<sup>66</sup>

Other artifactual materials in our computer data base include Nabataean, Late Nabataean, Roman red wares, and Byzantine ceramics — lamps, coins, bone, glass, metal, tesserae, and fragments of molded stucco and painted plaster. But the continued recovery of hundreds of architectural fragments delicately carved with complex floral and fruit designs continues to be overwhelming. The excavation of the West Adyton was made burdensome by the large number of architectural elements, including what we posit may be a complete capital from the Temple Cella Colonnade. The lower order of acanthus leaves (Fig. 23) was sculpted in two parts, and the upper order of crisp floral and

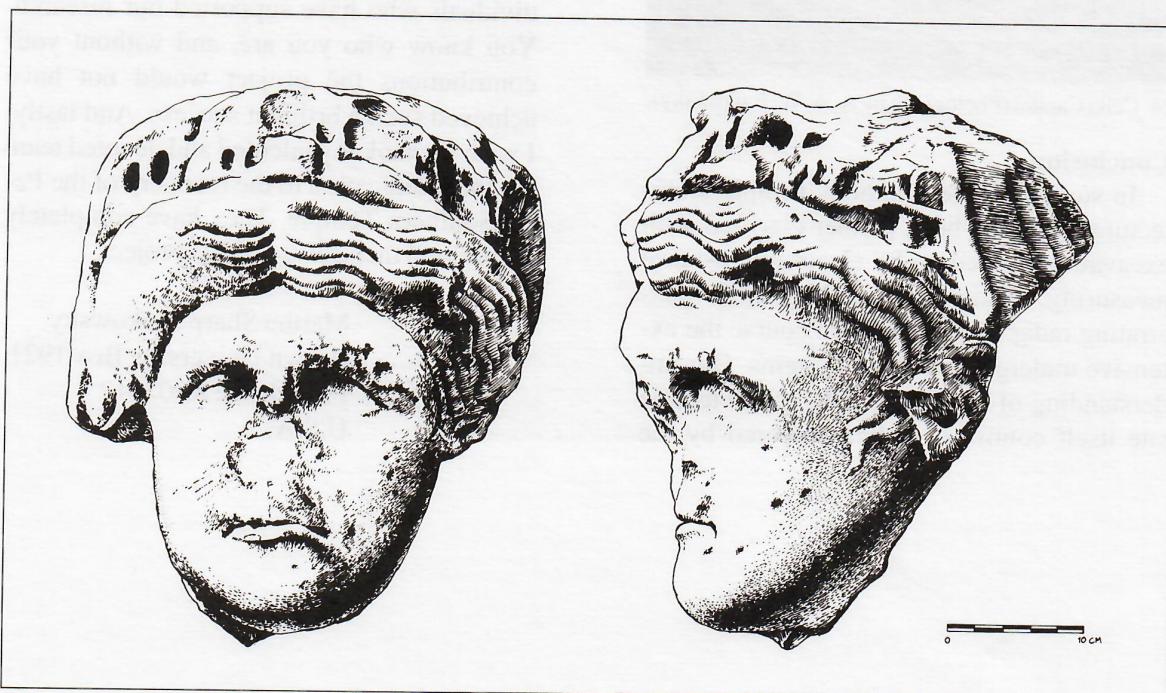
66. J. Basile will research and publish Tyche



22a. Head of Tyche (Photograph by A. A. W. Joukowsky).

fruit motifs was recovered in four parts, one of which is shown in Fig. 24.

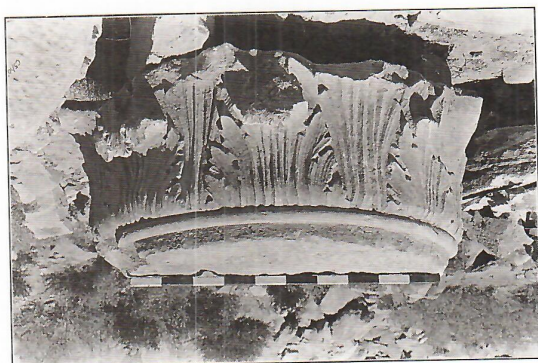
The catalog of more than 300 objects has been prepared for the Department of Antiquities, and all registered artifacts except the lamps, coins, and architectural fragments are in storage at the Petra Museum.<sup>67</sup> Of especial interest are the 37 elephant head fragments, 29 of which are elephant trunks. Using our data base, thousands of architectural fragments and registered pottery elements have been stored on-site. Animal bones have been transported to Amman where they will undergo analysis. Recovered and registered were some 57 coins, 172 lamps, most of which were fragmented, four figurine fragments, 12 bone artifacts including two complete bone pins and two spoon fragments, and five metal objects including a finger ring and a probable bracelet.



22b. Head of Tyche (Drawing by J. Blackburn).

67. Nabataean fine wares typological analysis will be undertaken by S. Schmid, and drafting of architectural details and small finds have been undertaken by J. Blackburn assisted by A. H. Bedewy. The continued study of the numismatic evidence

will be documented by C. Augé, and the lamp analysis will be submitted as a 1996 MA thesis by D. Barrett, a graduate candidate at Brown University's Anthropology Department.



23. Lower order of capital with acanthus leaves found in the West Adyton (Photograph by A. A. W. Joukowsky).



24. Cella Capital (Photograph by A. A. W. Joukowsky).

### Conclusion

In summary, the Southern Temple architectural plan has been further clarified with excavation backed up by electronic distance measuring equipment, and ground penetrating radar in an attempt to course the extensive underground water systems. Our understanding of the stratigraphy of the temple site itself continues to be hampered by the

lack of dateable materials. Thus our conclusions must remain tentative until they can be supported by sealed archaeological contexts.

1995 has been a most productive season of research at the Petra Southern Temple. In closing, I wish to acknowledge the assistance and support of Brown University for its subvention of this project, particularly Vartan Gregorian, President for his sincere encouragement. I also wish to express great appreciation to Dr. Ghazi Bisheh, Director-General of the Department of Antiquities for his interest in our work. He coordinated the use of heavy equipment to help us in the removal of overburden and architectural elements to on-site safe storage. Dr. Pierre Bikai and Dr. Patricia Bikai, of the American Center for Oriental Research in Amman, coordinated the logistical arrangements for our team, as well as the myriad of details involved. I am indebted to the many individuals who have supported our research. You know who you are, and without your contributions the project would not have achieved such a brilliant success. And lastly, I wish to thank my talented and devoted team for their dedication to the recovery of the Petra Southern Temple. They have completely committed themselves to this project.

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