

Dakhleh Oasis Project
Columbia University
Excavations at Amheida 2008
Architectural Conservation Work

Architectural conservation work on the North Tower at Amheida was carried out from 16 to 23 February under the direction of Dr Nicholas Warner with the assistance of SCA Inspector Ibrahim ‘Abd al-Hamid Ibrahim and SCA Conservator Baha’a Goma’a Ahmed.

1 Description of Existing Condition

The North Tower is one of the last surviving above-surface mudbrick features at the extreme north end of the site. Its dating is uncertain but is likely to be from the 2nd-4th century AD. Although it now in the process of being surrounded with modern houses of the adjacent Bedouin village, this is a comparatively recent phenomenon dating to the last twenty years. The villagers refer to the building as the ‘Deir’ or ‘Monastery’, though this appellation can only be generic. The original use of the structure may have been as a funerary monument, though this could only be ascertained through excavation. There are some parallels to the general appearance of the tower existing in Kellis (mudbrick) and Dionysias (fired brick). The tower has partially collapsed, and some of the mudbricks from the collapse have formed a crust to the north, south, and east of the surviving structure.

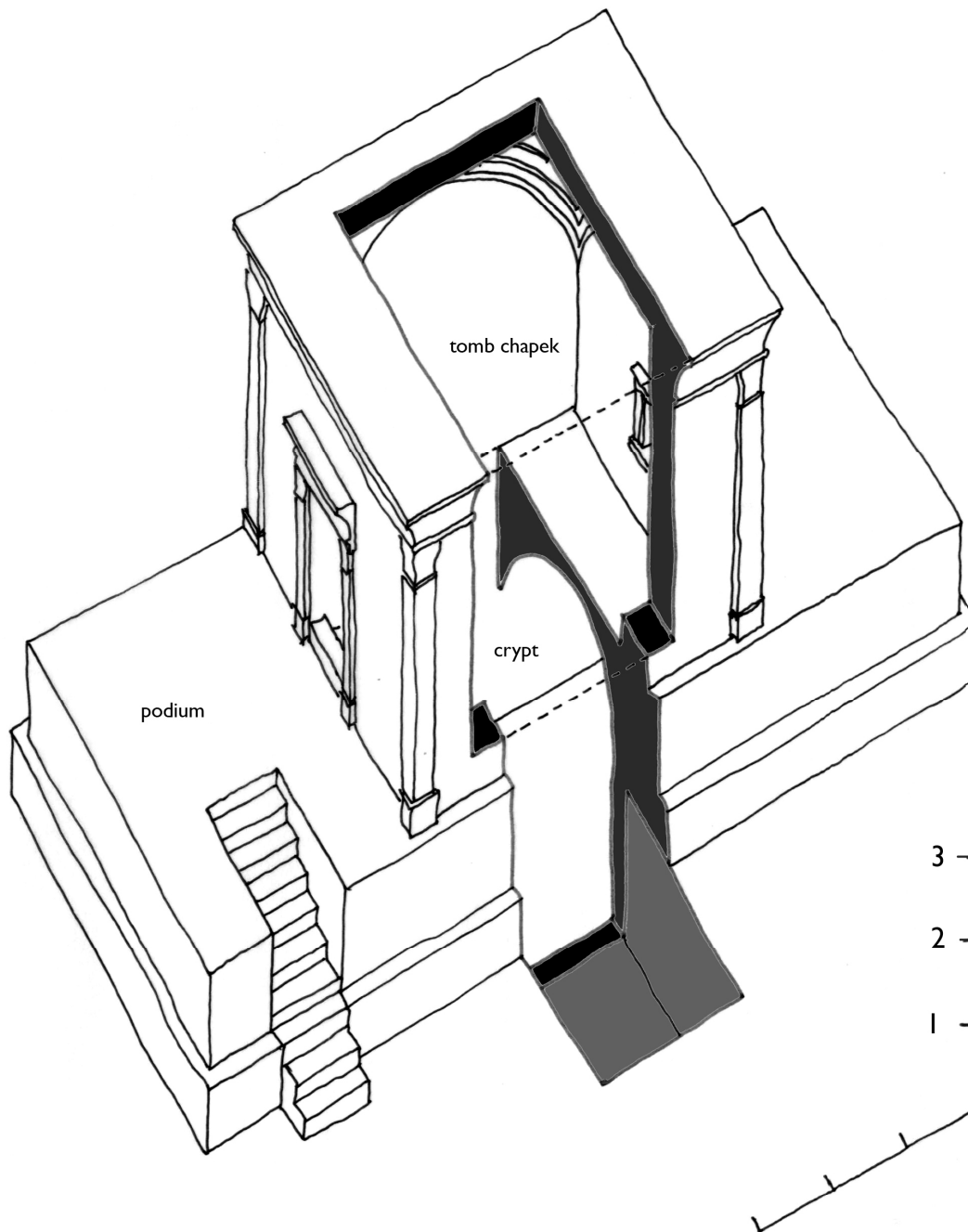
The tower has a rectangular plan of approximately 4 x 5 metres that is roughly oriented north-south. This orientation is almost exactly the same as that of the pyramid, which may or may not be coincidental. The tower stands to a height of slightly over 5 metres on an existing mound of tafl that has been cut to suit the foundations of the building. The east-west walls are at least 20cm thicker than the north-south walls (80cm as opposed to 60cm). This may be related to the fact that to the north and south are isolated remnants of mudbrick east-west walls constructed upon sections of the mound left standing when it was cut to receive the foundations of the tower. It is not known whether these walls might be the survivals of a raised vaulted platform that occupied the ground at least to the north and south of the tower if not all around the tower forming a kind of podium that gave access to the interior at a higher level. The podium may have been supported off the east-west walls of the tower in some manner. [see isometric reconstruction]

In section, the tower contains a 3 metre high pendentive-domed chamber (estimated from floor to crown of the vault), above a north-south barrel-vaulted space which is now filled with collapsed unexcavated material (springing of vault to crown estimated at 1.25 metres). The barrel-vault was constructed before the perimeter walls had risen above the level of the springing of the vault, as the

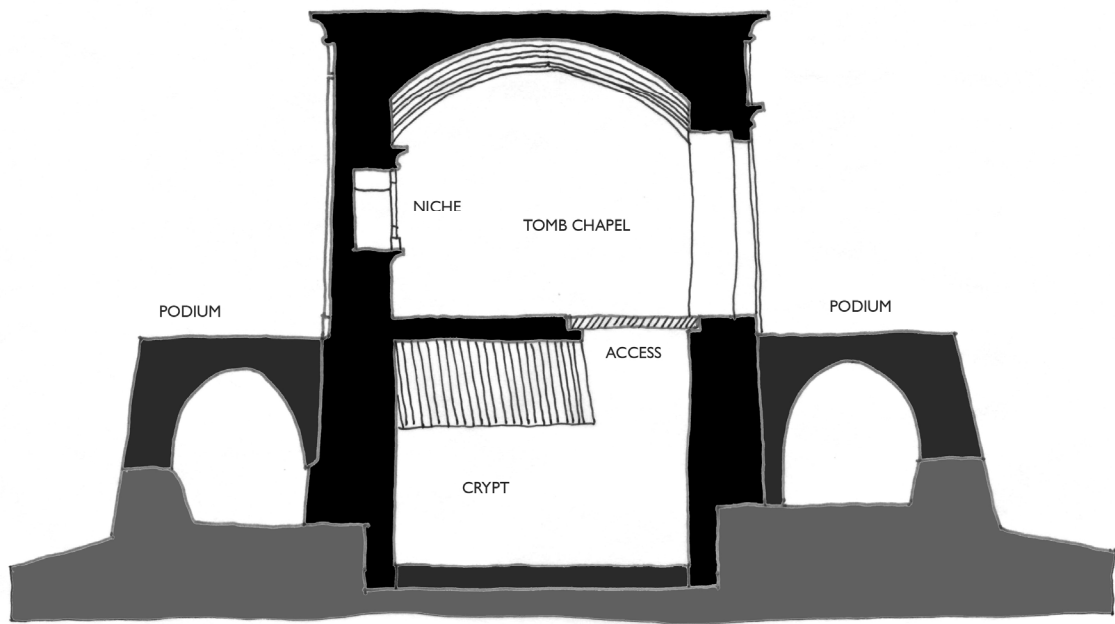
brickwork of the walls above this datum extends inwards to close the gap between the vault and the enclosing wall. The lower part of the tower, containing the barrel vault, is built plumb, while the upper section, containing the dome, is built on a slight batter. Judging from the surviving brickwork, the lower vault did not extend across the full length of the interior, but only occupied the northern two-thirds of the available space. The remaining third must have been covered in a different way, perhaps with timber beams, mats and mud. The barrel vault is an elliptical canted vault whose horizontal thrust is supported by the north wall. The most striking feature of the interior is the surviving section of the elliptical pendentive vault of the upper chamber which has 4 narrow (6cm) offset bands of brickwork, each one brick thick, that each project 2cm into the space. These are surmounted by a further rebate belonging to the brickwork of the concentric rings of the dome itself. The pendentive brickwork is laid in inward sloping courses, the bottom three courses being stretchers and the uppermost course headers. Parts of the original mud plaster and lime wash survive on the rebates of these offset bands, as well as on the pendentives of the dome, suggesting that the interior was at one time entirely limewashed. The mudbricks used in the construction measure 7 x 18 x 35cm for the walls and 6 x 18 x 35 cm for the lower vault. The bricks used for the rebated pendentive springings of the dome appear to be of larger dimensions (36 x 21 x 6 cm) although the concentric rings of the dome are built with the same bricks as used in the walls. The arches of each side of the dome are not exact semicircles but have two centres. The bricks have a reasonable percentage of chaff temper, not all of which has been consumed by insects. The bond is alternating courses of headers and stretchers as is typical for the Roman period.

The original entrance to the tower was at the floor level of the upper chamber, either to the north or the south. Both of these sides of the structure have substantial areas of loss in their fabric, but the relatively narrow area of loss on the north suggests that it is more likely that the entrance was on the south, where most of the wall has fallen away. This may mean that a niche may have occupied the lost area of brickwork on the north, as niches are most commonly and conveniently broken out to form doorways in the subsequent life of buildings in the Oases. Various robber holes and areas of collapse in the perimeter of the structure make a reconstruction of its original appearance difficult, but it seems that the exterior of the building was ornamented with pilasters. These are about 30cm wide and must have originally projected some 10cm from the face of each wall; they are located at the corners and at the centres of each respective elevation, excepting the south where the missing wall precludes any reconstruction except a stylistic one. The presence of the pilasters would indicate further, now lost, decoration in the form of bases and capitals and a cornice (perhaps a simple cavetto and torus moulding). The original entrance, now lost, may also have been framed by pilasters and had its own cornice. The height of the bases of the pilasters is aligned with the top of a set back of the section of the building corresponding with the assumed internal floor level above the barrel vault. A lower setback exists of 90 cm, or 12 brick courses, from external ground level. The exterior walls were undoubtedly originally

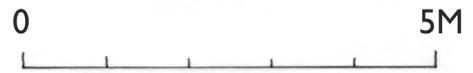
plastered with mud and limewashed. A number of cracks were observed in the structure which are detailed on the attached drawings; the most severe running full height being on the west flank wall.



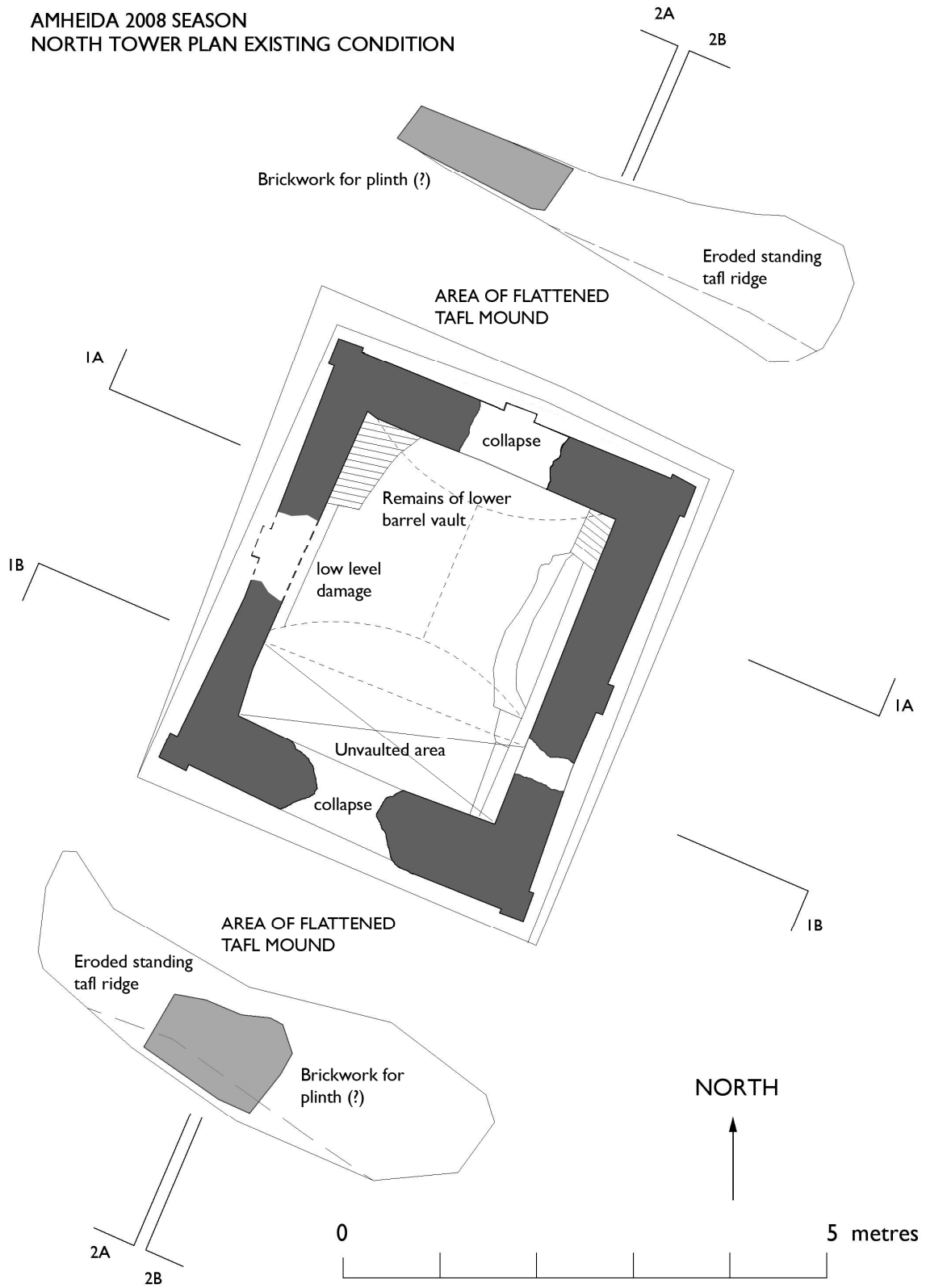
AMHEIDA NORTH TOWER
Cutaway Isometric Reconstruction from South-East



AMHEIDA NORTH TOWER
RECONSTRUCTED NORTH-SOUTH SECTION



AMHEIDA 2008 SEASON
NORTH TOWER PLAN EXISTING CONDITION



AMHEIDA NORTH TOWER

Rectified photography existing condition external elevations



EAST



NORTH

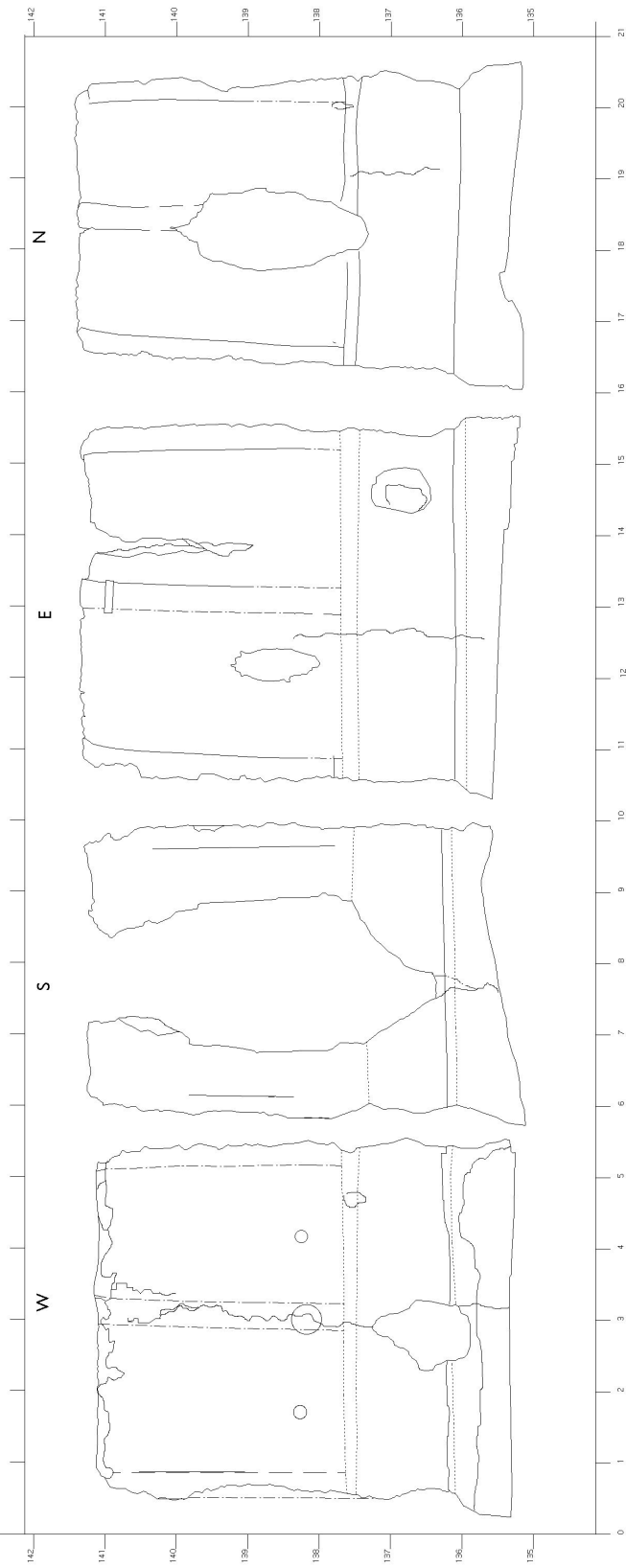


WEST

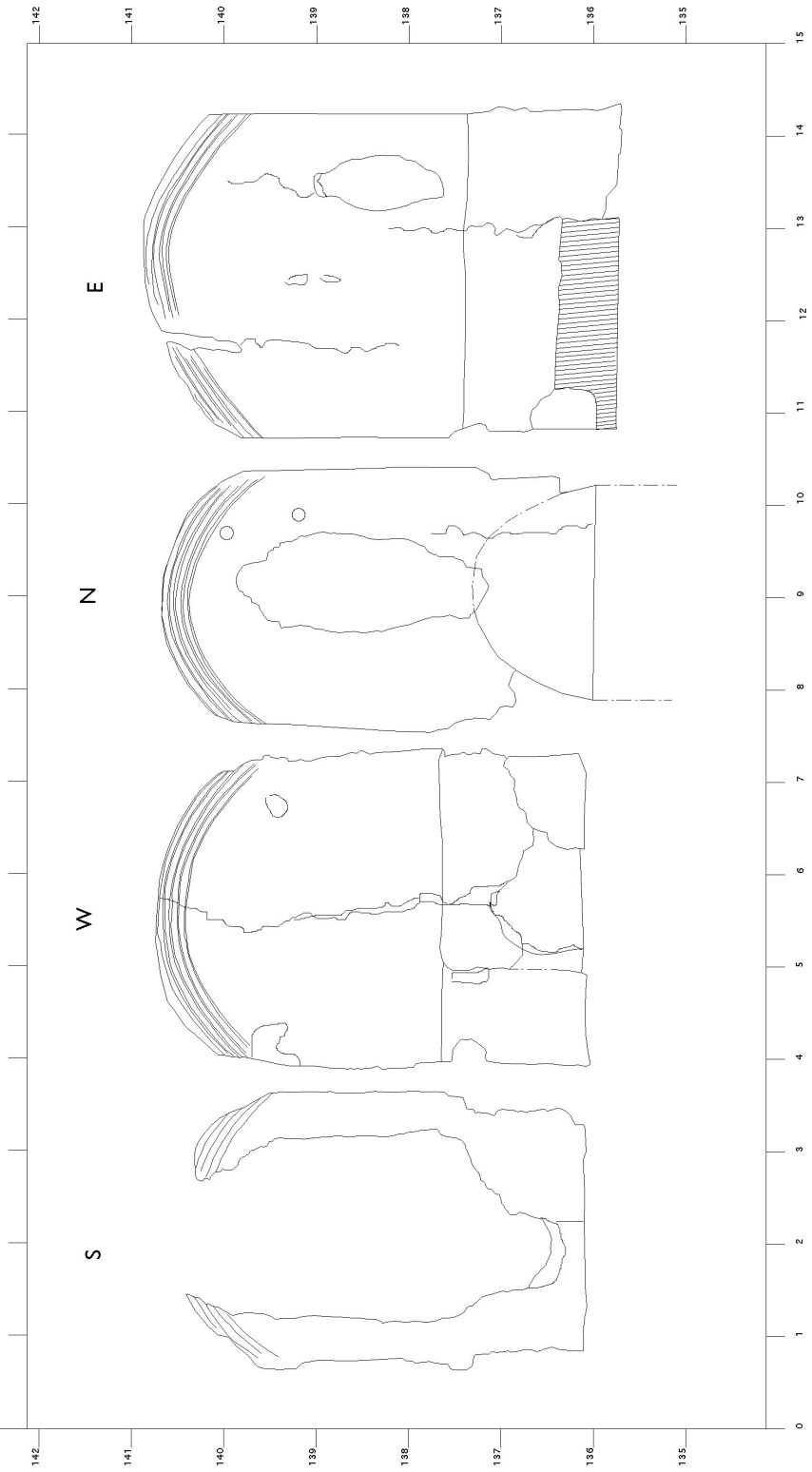


SOUTH

AMHEDA NORTH TOWER EXISTING CONDITION
External elevations 2008



AMHEIDA NORTH TOWER EXISTING CONDITION
Internal elevations 2008

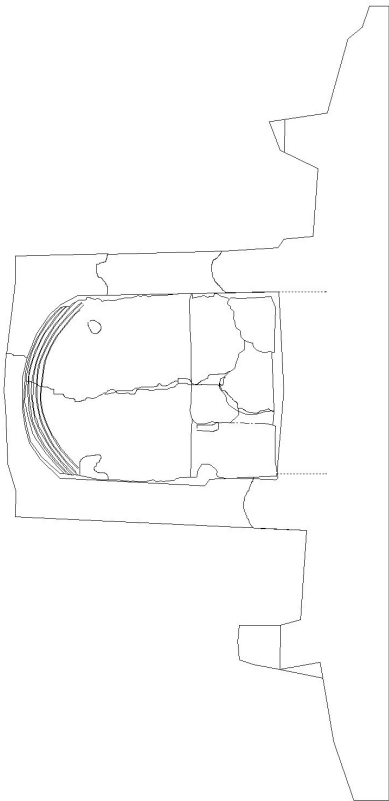




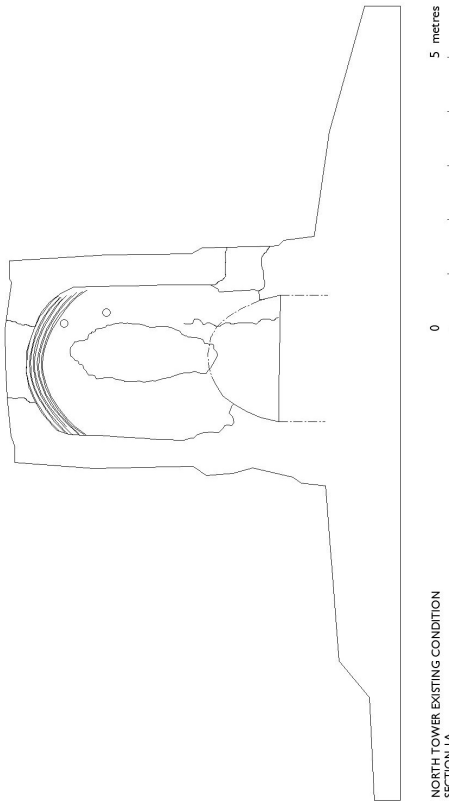
NORTH TOWER EXISTING CONDITION
SECTION 2B



NORTH TOWER EXISTING CONDITION
SECTION 1B



NORTH TOWER EXISTING CONDITION
SECTION 2A



NORTH TOWER EXISTING CONDITION
SECTION 1A

2 Interventions

Following the preliminary survey and photogrammetric recording by topographers Fabrizio Pavia and Silvia Maggioni some further observations were added to the documentation drawings by the author. Consolidation work then proceeded as follows using mudbricks without chaff temper and a mortar mix of crushed old and new bricks, *tafl*, sand, and a limited amount of fly-ash:

All openings due to collapse in the perimeter wall were filled with mudbrick in mud mortar to match the original bonding pattern as far as possible. On the north side, the infill provided the opportunity to reconstruct a section of the external pilaster on the external wall, and a shallow arched niche (hypothetical) on the internal wall. This niche (53 x 90cm to apex of niche head) is off-centred, being centred instead on the area of loss. The rebuilt wall follows the batter of the external façade.

On the south side, a painted steel grille double door with padlock, 90cm wide x 210cm high, was installed at the level of the original entrance. Timber lintels in the form of acacia wood (*sunt*), treated against insect attack with sump oil, were provided for this opening. Access to the interior can henceforth only be gained by ladder.

The springings of the pendentive dome were consolidated or reconstructed following the original design of four consecutive rebates. The fifth rebate was created in the same manner, rather than following the original concentric rings of infill brickwork for reasons of ease of construction. This work was mostly carried out on the south internal elevation above the new door, but a small section of the east elevation was also repaired in the same way.

The south-west corner of the tower was consolidated at ground level

After consideration it was decided not to stitch the crack on the west flank wall, as the areas of surrounding masonry had been consolidated.

Further action:

The crack on the west elevation should be monitored to see if it opens up any further in which case stitching with treated timbers every 90cm should be carried out.

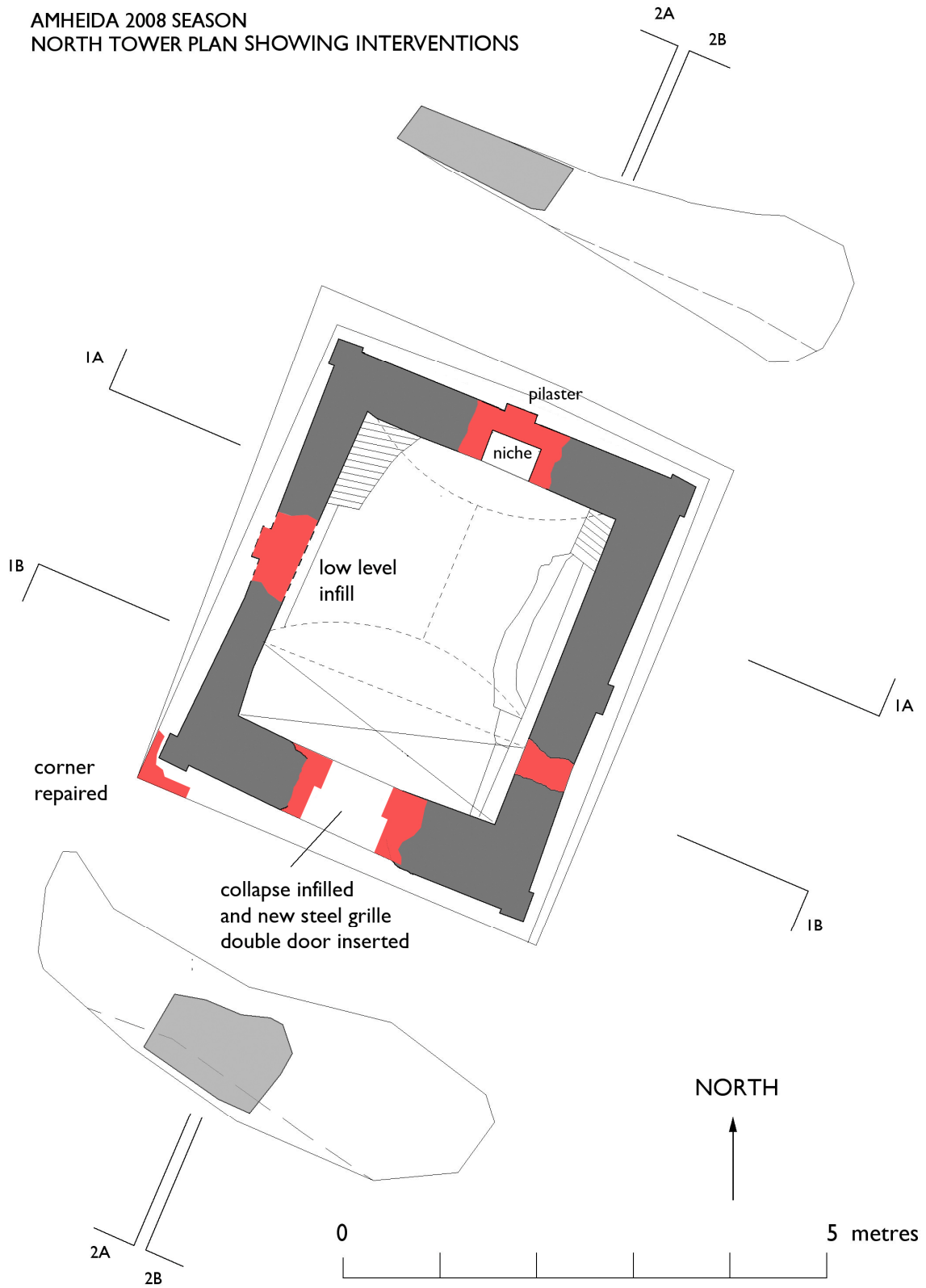
The barrel vault of the lower chamber might be partially reconstructed in order to show the original manner of construction more clearly.

Excavation of the fill in the lower chamber may shed further light on the function of the building, and there may be traces of preserved painted plaster on the walls at lower levels.

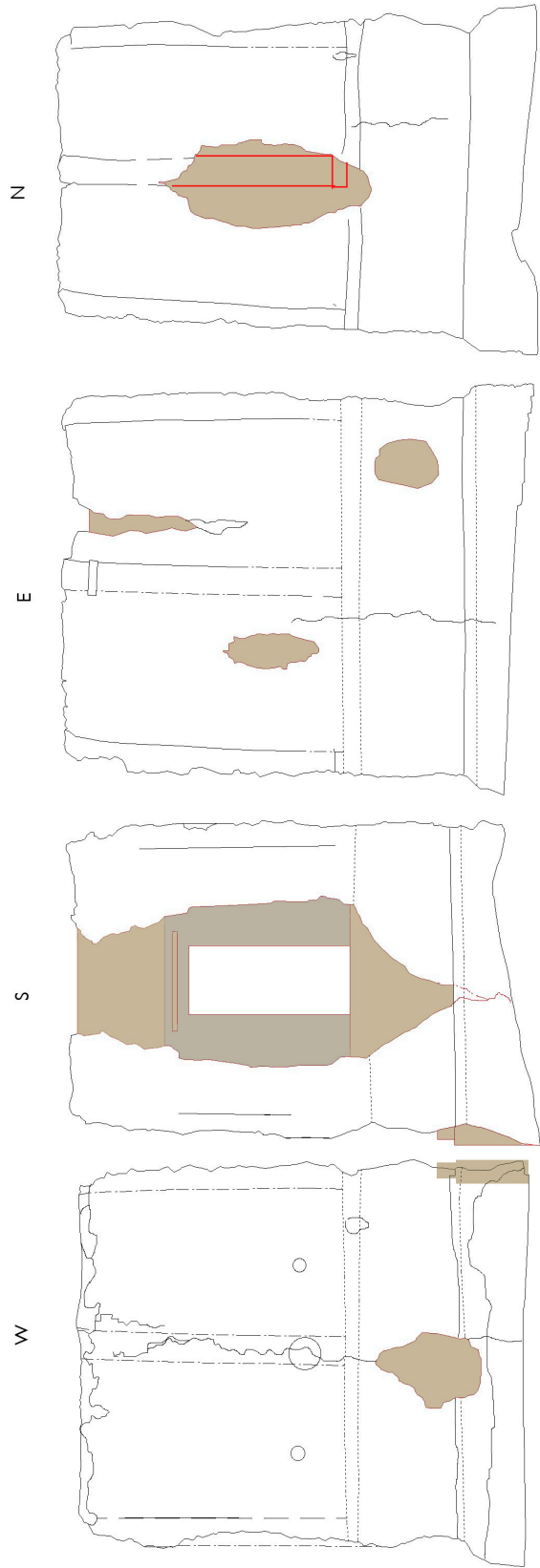
If the tower is to become a visitable attraction, a staircase will have to be constructed up to the door in the south wall. This could be made of mudbrick.

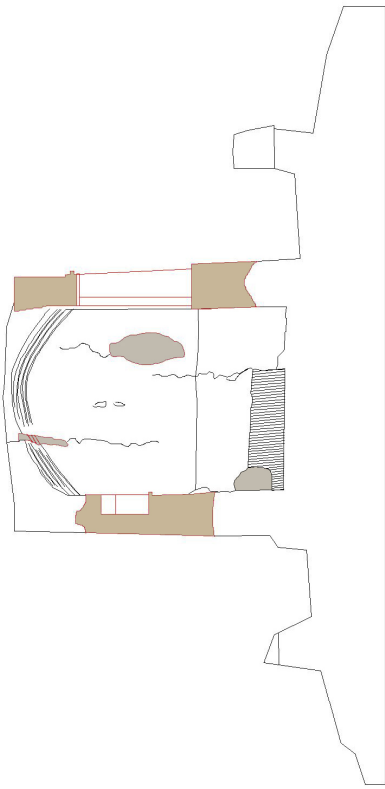
Dr Nicholas Warner

AMHEIDA 2008 SEASON
NORTH TOWER PLAN SHOWING INTERVENTIONS



AMHEIDA NORTH TOWER INTERVENTIONS
External elevations 2008

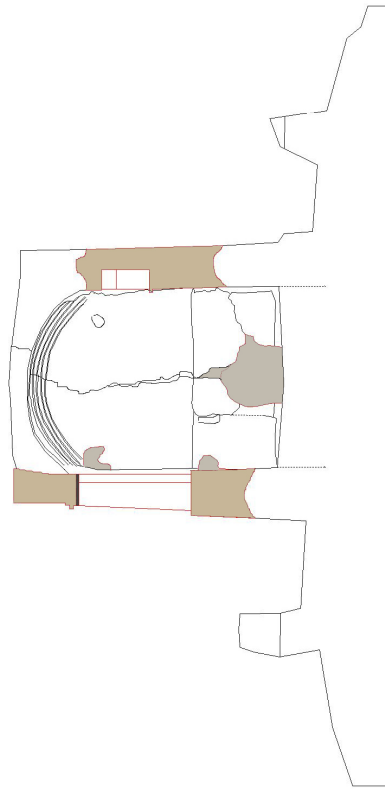




NORTH TOWER INTERVENTION
SECTION 2B



NORTH TOWER INTERVENTION
SECTION 1B



NORTH TOWER INTERVENTION
SECTION 2A



NORTH TOWER INTERVENTION
SECTION 1A

AMHEIDA NORTH TOWER POST-CONSERVATION



EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION



SOUTH ELEVATION

AMHEIDA NORTH TOWER: DETAILS OF DOME



DOME BEFORE CONSOLIDATION



DOME AFTER CONSOLIDATION



DOME AT HIGH LEVEL WITH RECONSTRUCTED NICHE ON NORTH WALL