

SPECIALIST REPORT

Dr. Nicholas Warner

“Red Monastery Architectural Conservation Project”

Cultural Heritage Tourism Project (APS)

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INTRODUCTION

Architectural conservation and presentation work was carried out at the Red Monastery Church over a period of four separate seasons [Season 1: October 24 – November 11, 2013; Season 2: December 16 – December 22, 2013; Season 3: April 08 – May 04, 2014; Season 4: June 11 – June 16, 2014]. The work was executed to the design and at the direction of Dr. Nicholas Warner with his team led by Mahmud al-Taiyyib. The appointed MSA site inspectors during this period were Mustafa Mahmud Ahmed Ahmed and Inji Atef Diab [Season 1], Mustafa Mahmud Ahmed Ahmed [Season 2], Karem Mahmud Mohamed Hassanein and Amr Mohamed Sadek Mohamed [Season 3], Hisham Gamal ‘Abd al-Gallil and Ahmad Amar Muhammad [Season 4]. The project was monitored regularly by Mr Saad Mohamed and Mr Ali Zaghloul of the Sohag Inspectorate, Mr Nureddin Mustafa Ahmed of the MSA Foreign Missions Department [Nag Hamadi Division] and visited by Dr. Adel Ghoneim of the Permanent Committee of the MSA during Season 1. On the side of the church, Abuna Antonious and Abuna Shenoute provided constant comment. Mr. Michael Jones of the ARCE made site inspections during all four seasons of work. The works were executed in accordance with the relevant permits from the Permanent Committee of the MSA, and included the following elements:

- 1 Installation of a complete new electrical network together with LED lighting
- 2 Installation of new limestone paving and steps in the enclosed area of the sanctuary and outside in the nave
- 3 Installation of new wooden doors and cupboards throughout the church
- 4 Consolidation of limestone column bases and all plaster losses within the church
- 5 Conservation of the original Heikal screen
- 6 Conservation of loose stone blocks displayed inside the church
- 7 Installation of new handrails in the sanctuary and north side chamber of the church
- 8 Replacement of sections of timber damaged by termites inside the church
- 9 Roofing works
- 10 Conservation of historic architectural features in the nave
- 11 Treatment of the 1912 Comité wall
- 12 Installation of a new altar
- 13 Installation of a steel post and chain fence outside the east enclosure wall

These components of the work are described in detail below.

1 Installation of a complete new electrical network together with LED lighting throughout the church

The electrical system in the Red Monastery Church is fully described in the consulting electrical engineer's [Michel Lamei] drawings and specification. The principal elements of the system are:

1.1 A main distribution board. This is located immediately to the west of the south doorway into the nave. The board has been sized to accommodate the present and future needs of the nave, the Church of al-Adra, and the Tower in addition to the main church. However, not all cables feeding the nave, Church of al-Adra, and Tower have been connected to this distribution board. For safety reasons it is recommended that the transfer of cables from the old distribution panel above the board is only attempted after the power supply from the main incoming line from the street is upgraded, with the installation of a single meter rather than the two present meters, as well as a new transfer switch to the second incoming line connected to the remote diesel generator and secondary substation.



The main distribution board and 3-phase stabilizer unit (left); the distribution board inside the church (centre right) and the external distribution box for the roof and staircase (right)

1.2 A three-phase stabilizer unit. This unit has been mounted next to the main distribution board. Its purpose is to stabilize the supply of power to the church and to avoid damage to the system caused by severe fluctuations in the power supply. In the event of a stabilizer cutout, the unit needs to be reset manually with a switch located at the bottom right hand side. This switch has a time delay on it of about 30 seconds.

1.3 A local distribution board for the church. A new cable has been installed running from the main distribution board to a new distribution board inside the church in the southwest corner of the khurus.

1.4 A local distribution box outside the church. A separate new cable has been installed running from the main distribution board to a new local distribution box outside the church mounted on the south wall. This supplies the electrical needs of the staircase, roof, and rooms at high level.

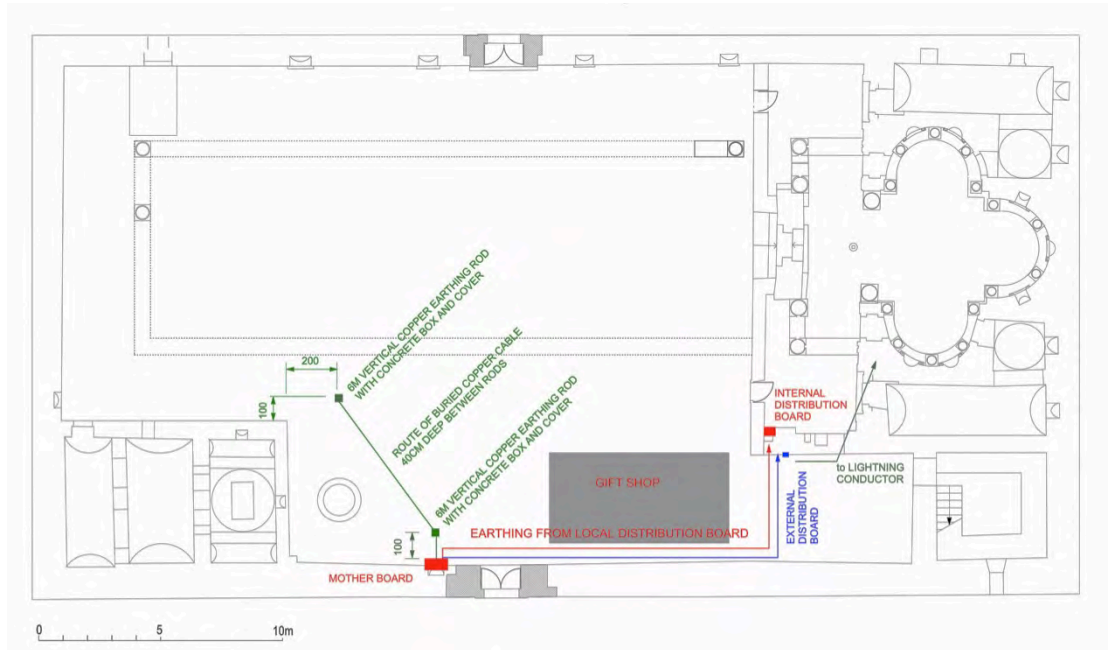
1.5 An electrical earthing system in the nave of the church. The new earth has a 1.33 Ohm rating, within the maximum 2 Ohm rating. The system uses two solid copper rods, driven vertically into the ground to a depth of six metres, in the positions shown on the attached plan. These are linked to each other by a twisted copper cable sunk 40cm underground, and connected with a bolt connector to the earth deriving from the internal electrical distribution board inside the church. The earth is also directly connected to a new lightning conductor mounted on the roof of the church.



Photographs showing installation of new earthing system



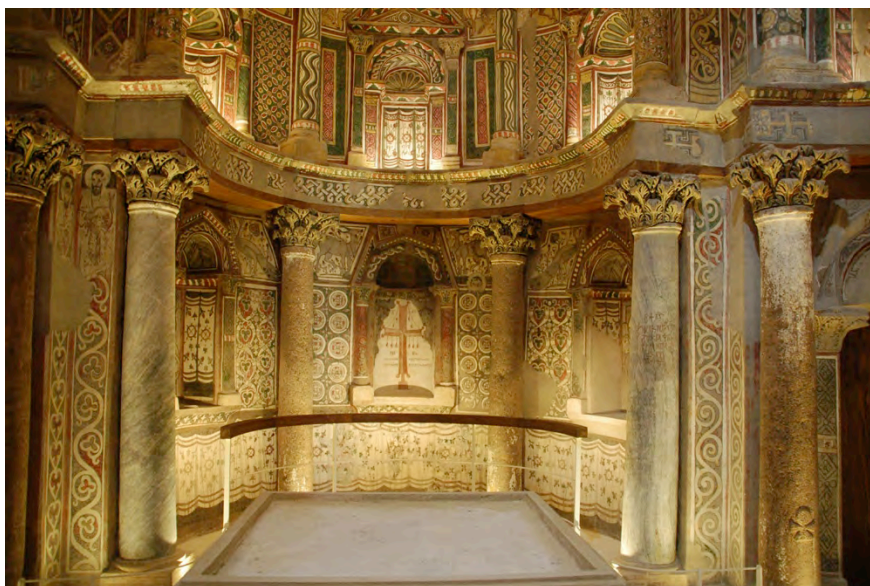
New lightning conductor on roof of church



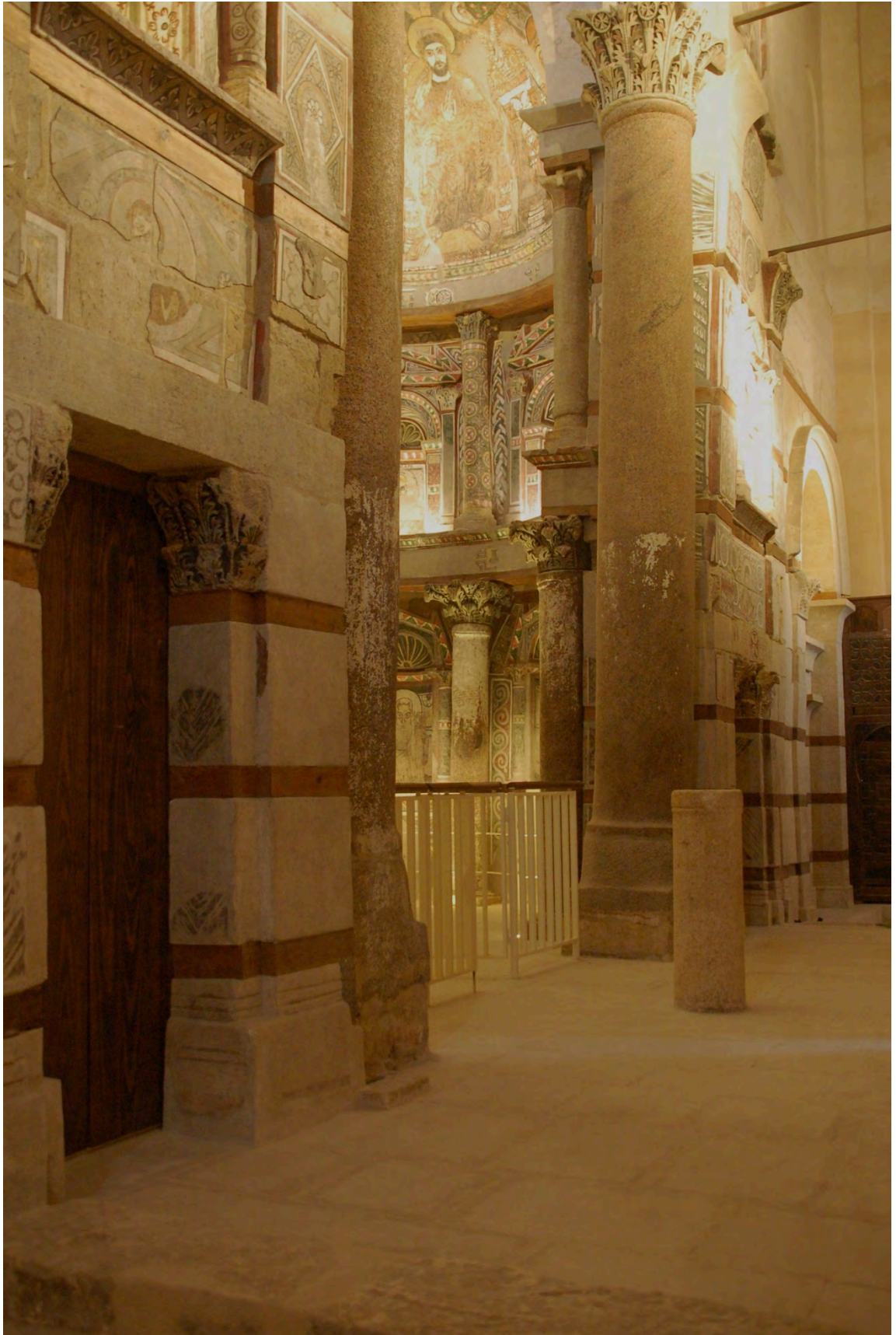
Location plan of electricity distribution points and earthing

1.6 New cabling. All new cables have been run in subsurface conduits to all power and lighting points within the church. Major secondary distribution points are located in the base of the altar and at high level on the platform above the trilobe portal.

1.7 Lighting. The lights in the church are all LED type, with no heat or UV emissions, supplied by Philips Lighting. Three types of light are used: large spotlights on the sanctuary façade and on the chandelier suspended from the dome; cove lights for the sanctuary first tier cornice and handrails as well as in the side chambers; floor recessed uplighters for accent lighting of the sanctuary columns. All these lights, with the exception of the floor-mounted units are direct feed: the floor spotlights have transformers located in the distribution box within the base of the altar. Spare units for each type of lighting fixture have been supplied to the Church.



Example of lighting of the east lobe lower level



Lighting of sanctuary façade and sanctuary

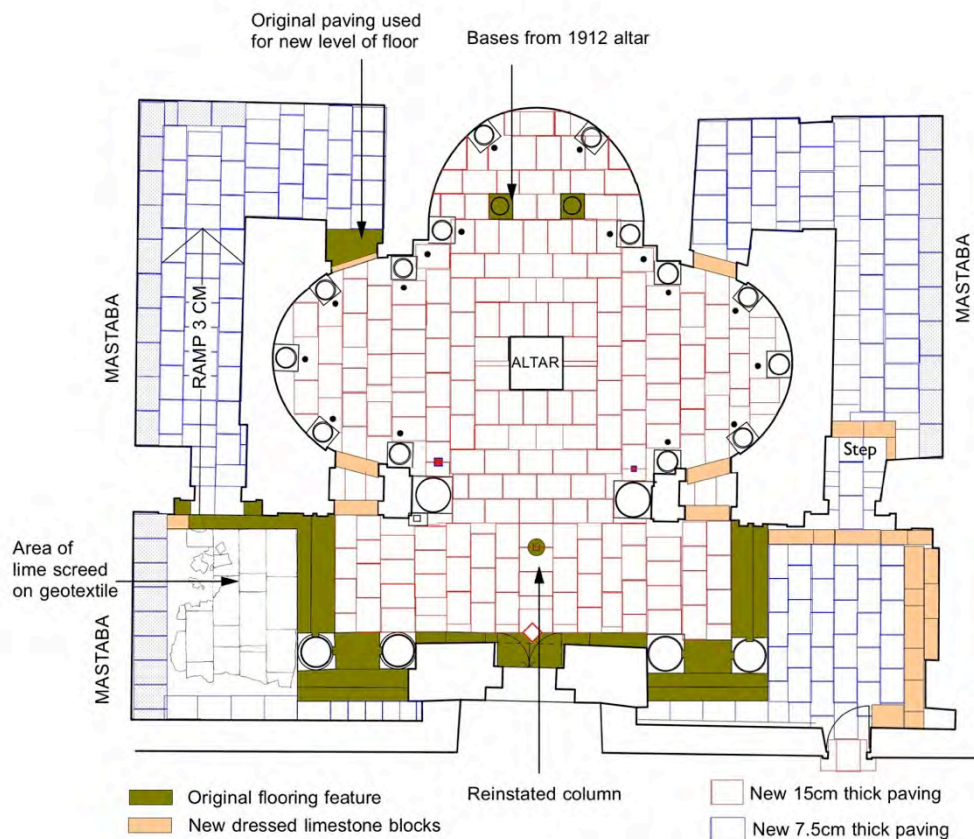
1.8 Extract Fans. Two high level extract fans have been mounted in existing window openings to be used as desired to reduce humidity levels within the church. These fans are operated from a switch inside the distribution box mounted on the outside of the south wall of the khurus.



High level extract fans at roof level

2 Installation of new limestone paving and steps in the enclosed area of the sanctuary and outside in the nave

Paving work was carried out both inside the church and at the east end of the nave. In all cases the paving was limestone from quarries in Helwan.



Plan of interventions in floor of sanctuary

2.1 Interior Paving. Inside the enclosed area of the church, new paving was laid in the sanctuary, the side rooms and south transept [khurus]. The paving was of two thicknesses: 15cm for the sanctuary and 7.5cm for all other areas. The paved area was first covered with a layer of dry lime to discourage subsurface termite activity. The thinner slabs were laid in a lime mortar bed to which a small percentage of diethyl succinate [dimethoxythiophosphorylthio] was added as an additional deterrent against termites. The thick slabs were laid dry with lime mortar joints and finished with a toothed adze (*shahouta*). The thin slabs were finished by sanding.



Dry lime spread on floor to deter termites (left) and finishing blocks by hand with the *shahouta* (right)

Prior to the commencement of the flooring, the bases of walls and some columns in the sanctuary were consolidated in eroded areas with new brickwork set in lime mortar. The location for the new altar in the center of the sanctuary was also established with a new brick base: the altar will be completed at the end of the project. The base of the altar also serves as a major electrical junction box.



Consolidation of bases of wall with new brickwork in lime mortar (left) and construction of base of new altar in sanctuary (right).

Levelling the floor

The level of the paving was set by the presence of surviving blocks in the doorway from the north lobe into the north side chambers. This level was used throughout the sanctuary, except in the following areas:

1 North long side chamber: a 3 centimetre drop in level to accord with the step up into this room from the north transept was achieved by a slight fall along the length of the room.

2 South long side chamber: a 15 centimetre drop in level was achieved by the addition of a step made from cut limestone blocks.

3 Wherever reinforced concrete beams projected above the level of the new floor.



The entrance to the north side chamber showing original slabs that were used as the level for the new flooring (left) and concrete beam in south side chamber projecting above the new floor level (right).

The projecting platform and steps

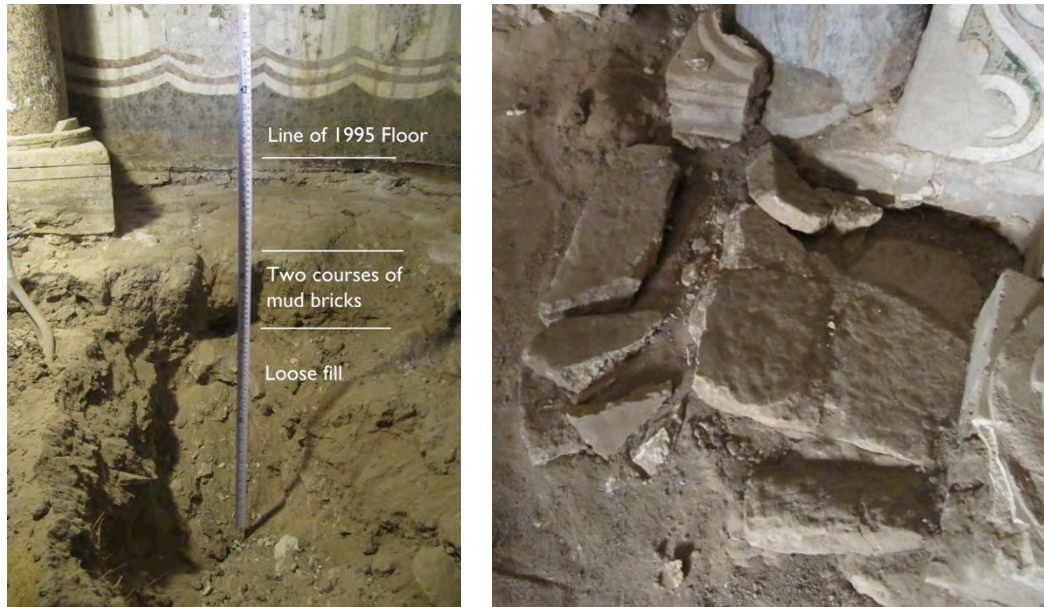
In order for this level of the new floor to be consistent, it was necessary to raise the cracked limestone block on the south side of the projecting platform by 5 centimetres. This block is now level and does not pose a trip hazard for visitors. Cracks and postholes in the platform steps were filled using lime mortar and fine gravel, after documentation. The limestone step in front of the north side chamber was completed with a single new dressed limestone block, while the step on the south side was completed entirely in new dressed limestone blocks following the original alignment. This alignment returns along the south wall of the khurus.



Lifting east side of broken stylobate block 5cm to achieve level condition (at right)

The East Lobe

The archaeological remains of the mud brick blocking walls in the east lobe were found to consist of two layers of mud bricks laid over fill. These courses were removed in the north and central section of the lobe, but were left in the south section where they were below the level of the new floor. The badly damaged section of original flooring in the southwest corner of the east lobe was impossible to preserve in situ and was removed.



Remains of mudbrick blocking walls in east lobe (left) and fragmented section of original floor in southwest corner of east lobe (right).

Also in the east lobe, two blocks with circular depressions serving as column emplacements, part of the altar that was installed here in 1912 and demolished in 2008, were reset close to their original positions at the level of the new floor, and the depressions filled with new limestone plugs. These blocks provide a physical reminder of the altar that once stood here. Another limestone block that was reused in the altar, carved with a cross, was put on display in the church in the north side room.



Existing blocks with circular depressions either side of 1912 altar, before incorporation into new floor.

North Area of Khurus:

In the north area of the khurus, where a large section of the original stone paving of the nave is preserved, special conservation measures were undertaken. The original blocks were first covered with a geotextile membrane, and a lime screed was then laid over this in two layers. The composition of the screed was as follows:

Layer 1 (below): 5cm deep and consisting of 1 lime, 1 sand, 1/2 gravel and 1/2 coarse ground brick, 1 fine ground brick with a small additive of fly ash.

Layer 2 (above): 2cm deep consisting of 1 lime, 2 sand, 1 fine ground brick with a small additive of fly ash. A wooden float was used for finishing.



Geotextile membrane laid over surviving original floor in north area of khurus (left) and completed lime screed (right).

The final component of the restitution of the original appearance of the floor was the re-installation of the limestone column/post in the centre of the khurus in front of the sanctuary in its original position.



Reinstated limestone column in centre of khurus seen from south (left) and from east (right)

The finishing of the edges of the floor at junctions with painted plaster surfaces was done with a non-permeable plastic barrier that was later trimmed off. Column bases were fixed in position where they had been detached. Final finishing of all cracks and joins was carried out by the fine conservation team in Season 3 [see section 4, below].

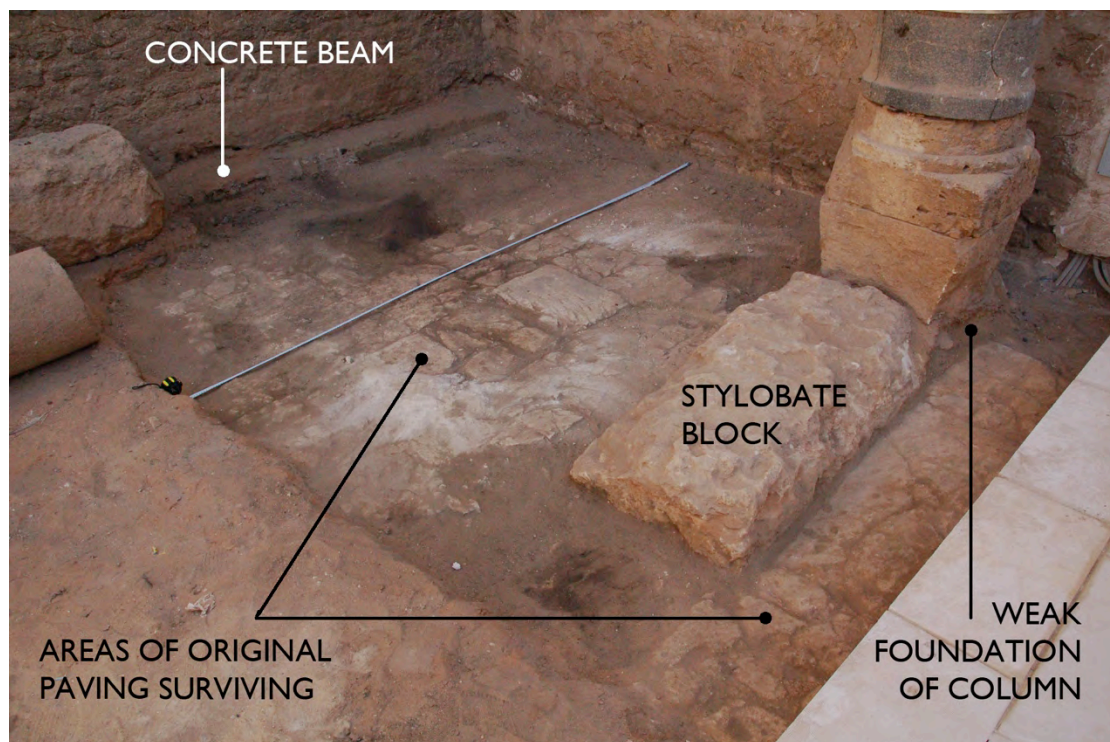


Finishing the junction of the floor with the painted plaster surface (left), and re-setting detached limestone collars at the bases of the granite columns (right).

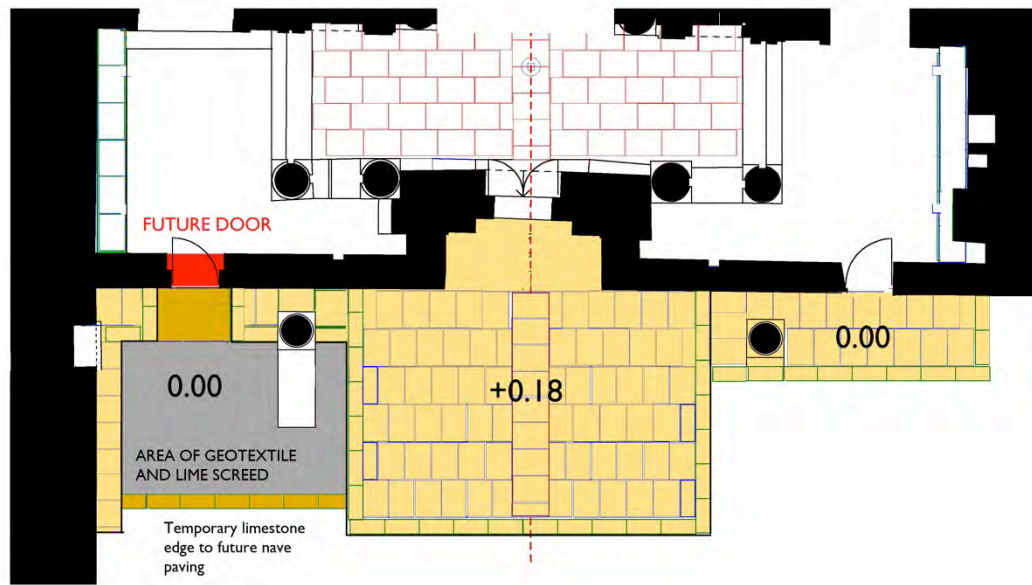
2.2 Paving in the nave:

The existing white block platform in front of the central doorway to the church was removed and the installation of new limestone paving and steps in the nave was completed. The stone is from quarries in Helwan and was finished with a toothed adze (*shahouta*). The level of the new floor in the nave was set at 18cm lower than the raised central platform. Owing to the fact that the ground of the nave currently slopes down from north to south by 36cm, the floor has a step in it at the south side. This will not be apparent when final paving of the interior of the nave is executed.

On the north side of the platform, an area of approximately four square metres of the original limestone floor belonging to the nave was discovered, close to the existing stylobate block on this side. To protect this floor, it was covered with a geotextile and lime screed matching the specification of the screed that was used over the floor discovered in the area immediately to the east within the Comité enclosure wall. In order to consolidate the base of the existing column on this side of the nave, which has no proper foundation, the level of the platform was continued around the column base extending in front of the façade of the wall by 90cm. A new plastered brick and limestone mastaba was constructed at the same height over the existing concrete raft dating to 1995. This was done for aesthetic reasons. An opening was left in the step to provide access to the future new door in the Comité wall [see 3, below].



View of original paving discovered in northeast corner of nave



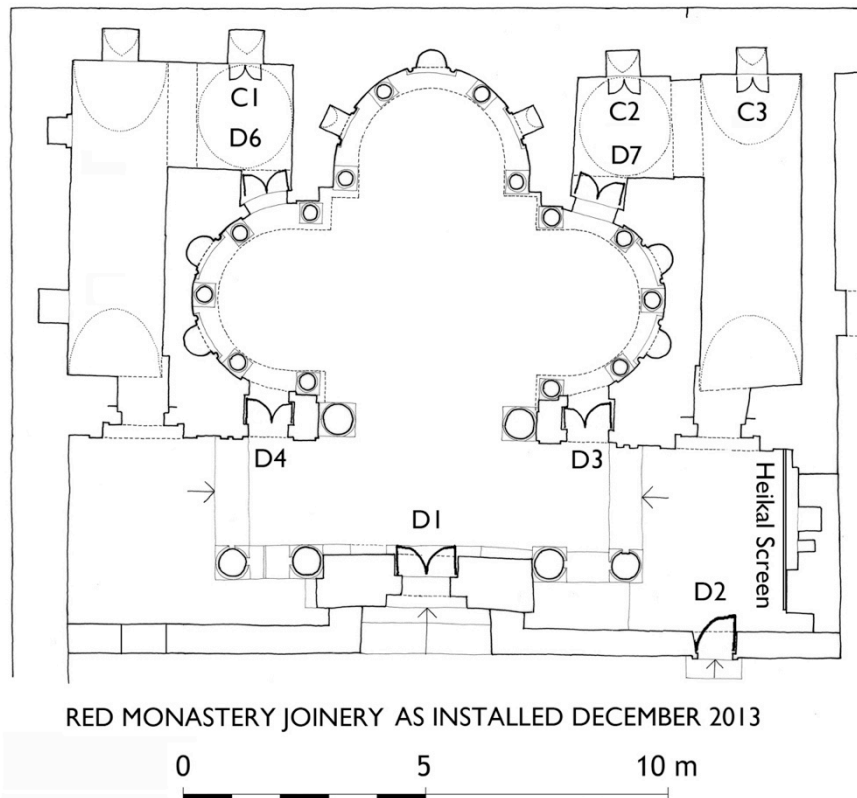
Plan of new paving in nave



Views of new paving in nave

3 Installation of new wooden doors and cupboards throughout the church

Doors and cupboards were installed in the positions shown on the attached plan. All joinery was made from pitch pine (azizi) finished with wood stain and sealer. D6 and D7, the doors from the sanctuary to the side chambers, have locks on them to restrict access to the sanctuary from these areas.



New doors from sanctuary to north and south side chambers.



The north domed side chamber showing new cupboard with integrated lighting and door (left) and the new font cupboard in the south side chamber (right)



Details of new joinery

In addition, a new timber (azizi) cross with stainless steel fixings was also installed on the dome of the church, lit with an externally mounted spotlight.



The new cross on the dome of the sanctuary

3.1 Installation of doors in outer façade wall. Two doors made from pitch pine (*azizi*) were installed in the wall of the church facing the nave, replacing badly damaged modern doors. In the centre, a double leaf door on stainless steel pivots was put in place using the existing timber lintel. This door was decorated with a cross cut from brass sheet. The south door was installed with a frame set within the depth of the wall, and given a projecting hood to provide some shade from the fierce sun on this corner of the building.



New central and south doors in the Comité façade

4 Consolidation of limestone column bases and plaster losses within the church

The fine conservation team consolidated all gaps at the bottoms of the walls using a fine lime mortar. All cracks in the column bases in the sanctuary were also consolidated, as well as losses around doorframes. All grooves cut for the new electrical installation were also filled. Areas of new fill and replacement were treated with a surface coloring to match original adjacent finishes or earlier repairs as appropriate.



Fine conservation team filling losses at the base of the triconch walls



Fine conservation team filling losses around doorways and column bases

5 Conservation of the original Heikal screen

The Heikal screen was moved to a position on the south wall of the khurus. It was then repaired with a new secondary subframe and fixed to the wall prior to cleaning. The gap between the top of the screen and the south wall of the khurus was filled with an overlapping timber roof. The central window of the screen has a built in cupboard to prevent rubbish from being thrown behind the screen. This cupboard can also serve as a receptacle for the written prayers that are frequently left by visitors to the church.



Moving the screen to its new position against the south wall of the khurus (left), and detail of new secondary frame on inside of screen (right).



View of repaired screen fixed against south wall of khurus.

6 Conservation of loose stone blocks displayed inside the church:

Surviving blocks with carved decoration were displayed inside the church in two location: the north long side chamber and on the south wall of the khurus.

6.1 Carved blocks in the north side room. A limestone block with a carved cross, originating from the demolished altar was installed on a new purpose made painted steel support in the east niche of the north side room. A damaged column capital was placed on a new painted steel stand in the west niche on the north wall, above a surviving column base and a further capital from a door jamb was installed on a painted steel shelf in the east niche on the north wall.



The north side room showing newly displayed blocks (left) and detail of mounting of block with decorative cross (center and right).

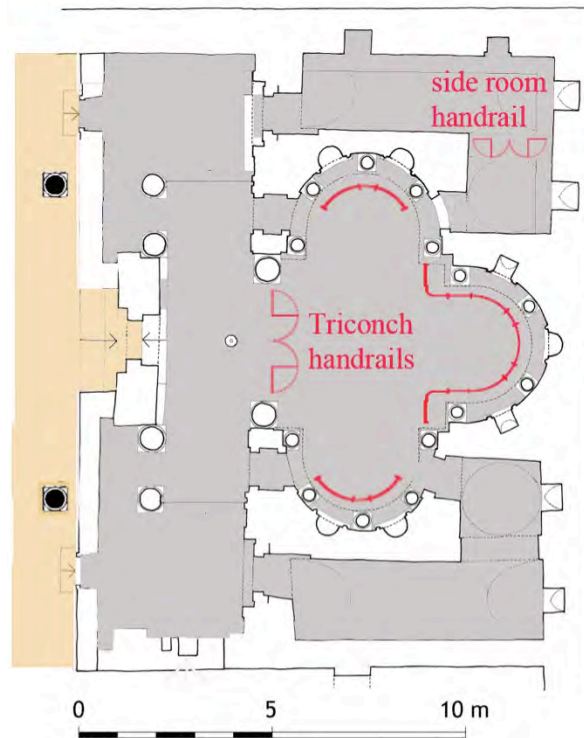
6.2 Carved blocks on the south khurus wall. A number of loose cornice blocks and a small column were built into a new brick wall set with lime mortar to serve as a display of the smaller fragments deriving from the original fabric of the church. All blocks were cleaned using poultices with a dilute ammonia solution.



Cornice blocks (left) prior to installation of three blocks in new spolia display (right)

7 Installation of new handrails in the sanctuary and north side chamber.

New metal handrails were installed inside the sanctuary and north side room, in the positions marked on the attached plan. Metal was chosen to remove the possibility of the handrails being attacked by termites. The handrails in the north, south, and east lobes contain additional LED lighting to illuminate the low level niches of the triconch. The handrails were set into the floor and fixed with molten lead. All handrails had wooden top rails installed, made of seasoned pitch pine [*azizi*], and visible metal sections are painted ivory color to match the floor and provide minimal visual intrusion.



Location plan of new handrails



General view of handrails in the sanctuary with timber top rails



Handrail in the north side chamber (left), and handrail at entrance to triconch (right)

8 Replacement of sections of timber damaged by termites inside the church.

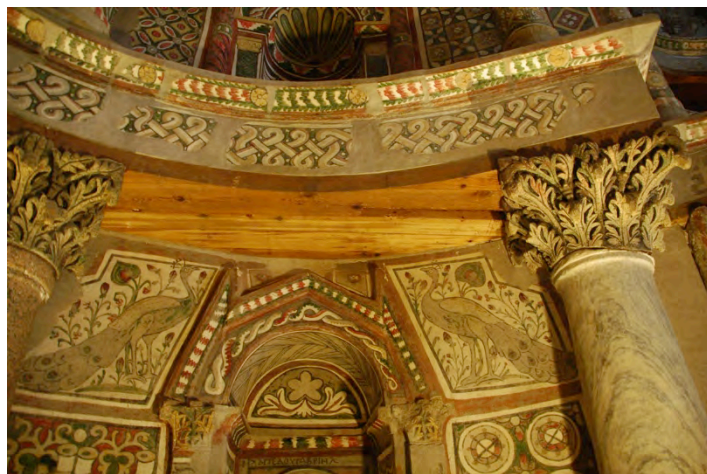
Termite activity was discovered in three separate areas of woodwork inside the church: on the lower north side of the sanctuary façade; in the east lobe lower cornice; and in the north lobe lower cornice.

8.1 On the lower north side of the sanctuary façade, a section of timber banding which had been partially eaten by termites was replaced. This proved that the termite damage was superficial and did not extend to the inside of the wood. The new wood (azizi seasoned pitch pine) was treated with ‘Woodserve’ although there was no evidence of current termite activity. It was then stained to match surrounding wooden elements.



Detail of termite damaged wooden banding (left) and replacement timber (right).

8.2 In the east lobe lower cornice, low level termite activity was detected, but there was evidence that quite a large area of woodwork had been attacked. The affected areas were cut out and replaced with sections of seasoned and treated pitch pine (*azizi*) after thorough cleaning of internal areas and spraying with 'Woodserve' preservative.



Sequence of treatment of termite damaged timber in east lobe of triconch



Sections of termite damaged lintels removed from the east lobe.

8.3 In the north lobe lower cornice, low level termite activity was detected, affecting a small area of timber. This was cut out and replaced with a section of seasoned and treated pitch pine (*azizi*) after thorough cleaning of internal areas and spraying with 'Woodserve' preservative.

9 Roofing works:

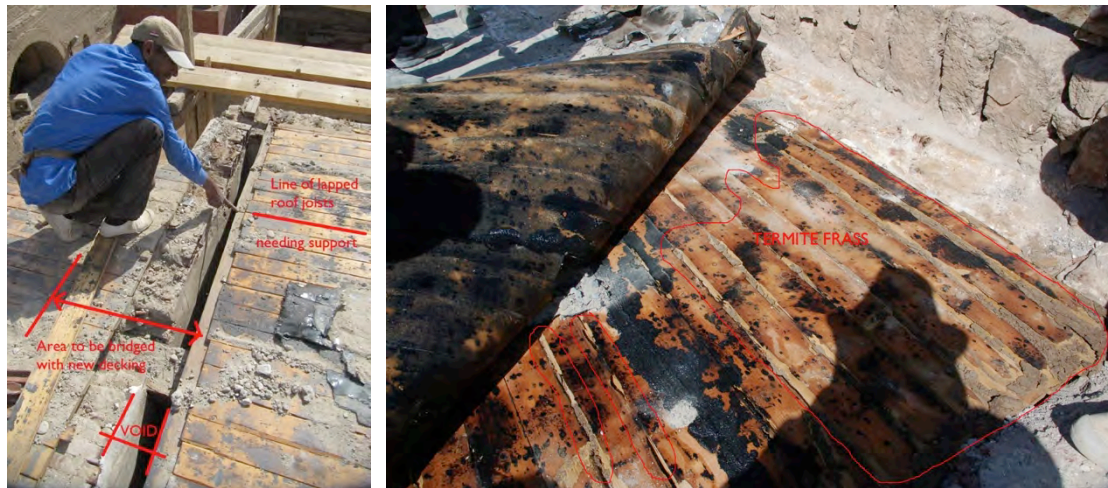
Following the stripping of the 1995 concrete and bitumen from the uppermost levels of the 1912 roof over the khurus on April 10 it was revealed that:

- 1 The timber decking, dating to 1995, was not continuous between the roof over the central part of the khurus and the overhangs to either side. There was a gap of 20cm between these two sections of roof that was only bridged by the existing bitumen sheet.
- 2 The roof beams above the platform over the trilobe portal were not continuous but had lapped joints, forming an extremely weak connection liable to failure [Drawing 1 and 2].
- 3 There was a severe infestation of termites in the lower roofs affecting the timber boarding.
- 4 Additionally, it was noted that holes made to allow rainwater to drain off lower sections of the roof were not fitted with rainwater spouts.

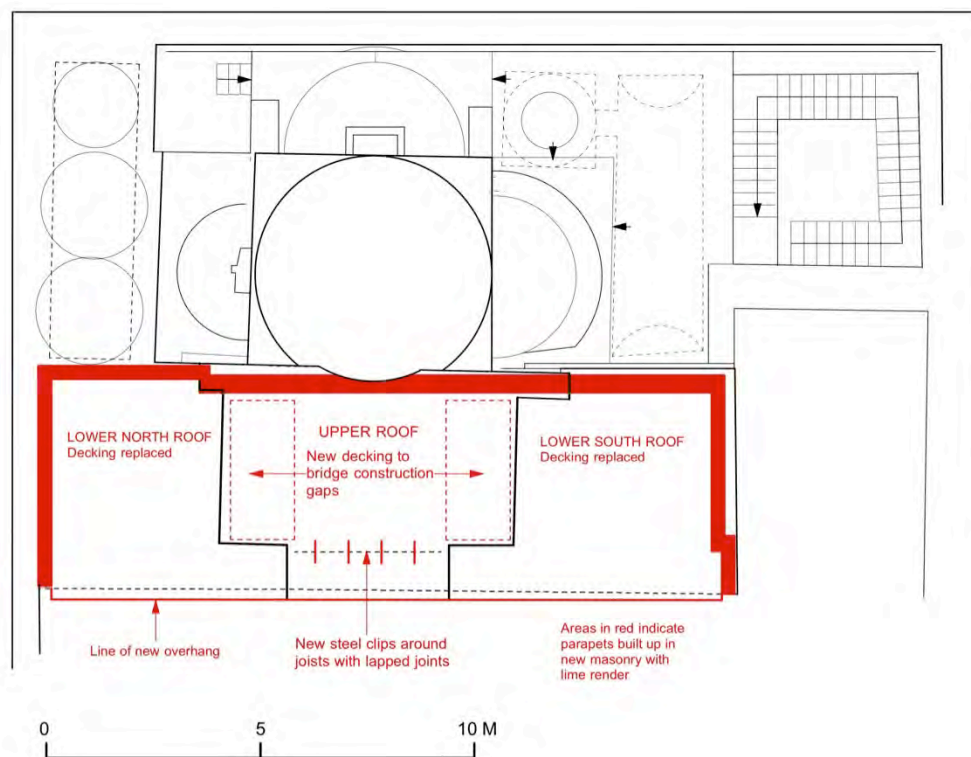
The following interventions were made in order to safeguard the roof:

- 1 The gap in the decking of the upper roof was bridged with new timber decking.
- 2 The roof beams of the upper roof were strengthened with steel clips
- 3 The timber decking of the lower roofs was replaced with new 1" decking, treated with chemicals against insects and painted with red oxide to match the surface finish of the existing roof.

Following this, the roof was lined with a new bitumen roll isolation and covered with a 75mm white cement screed reinforced internally with a galvanized metal mesh. Galvanized metal flashings were used around the perimeter of the roof, and a new overhang [*rafrafa*] was installed to shed water away from the face of the Comité wall. In order to provide a good construction detail, the back [east] and side [north and south] edges were built up with new brick masonry and lime mortar, covered with new lime plaster. Two new galvanized metal rainwater spouts were fitted to the lower roofs on the east side of the building extending beyond the line of the east façade.



Condition of high level roof above khurus looking west before works [left] and condition of low level north roof showing partial extent of termite activity [right]



New rainwater spouts on east façade from lower areas of roof



Replacement of termite damaged roof decking with new treated timber



View of completed roof seen from east

10 Conservation of historic architectural features in the nave:

10.1 The existing grey granite column shaft, with its limestone capital dating to 1909, standing on the north side of the nave was cleaned. The existing rusted metal bands were replaced with seven new stainless steel bands to stop the column from fragmenting due to vertical cracks. It was discovered that the limestone base of the column had no adequate foundation, and so it was stabilized by setting new 18cm thick limestone blocks around its edges. The open joint between the column base and the adjoining stylobate block was filled with lime mortar. *Note: the column is not vertical, and there are no pins connecting base to the shaft or the shaft to the capital, so any possible movement should be visually monitored.*



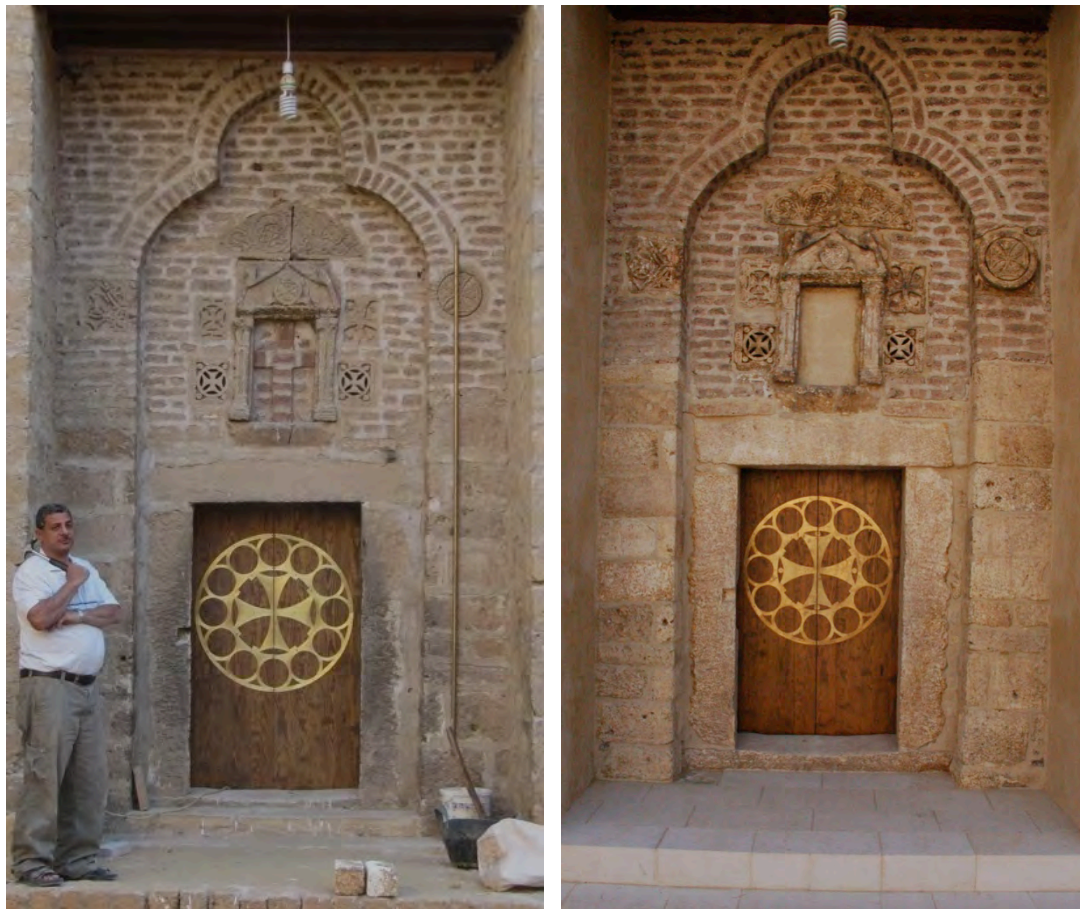
The grey granite column before and after conservation [left and center] and detail of new stainless steel banding around fragmented shaft.

10.2 One of the existing fallen Aswan granite column shafts lying in the nave was cleaned and set up on a new limestone base in the south side of the nave. Above the shaft, an existing limestone Corinthian style capital was installed after cleaning with poultices of dilute ammonia. The base, shaft and capital were pinned together with stainless steel rods set in epoxy, and lead sheet was used to separate each feature. The assembled column and capital were fixed securely back to the Comité façade wall with a stainless steel bar in a sleeve set within the top of the capital.



The Aswan granite column being raised and after installation [left and center] and detail of restored Corinthian capital.

10.3 The existing trilobe portal at the center of the façade was conserved. All cement was removed from joints, revealing that the original masonry was laid in a silt mortar. The lower undecorated blocks were cleaned and repointed using a lime mortar. The carved blocks in the upper section of the portal were cleaned through the application of poultices with dilute ammonia, and all joints repointed with lime mortar.



Trilobe portal before and after cleaning

10.4 At the west end of the nave, badly damaged existing limestone stylobate blocks were consolidated with lime mortar and new infill masonry as required.



Consolidation of stylobate blocks at west end of church in progress.

11 Treatment of the 1912 Comité wall:

11.1 Exterior: The stone rubble exterior of the Comité 1912 wall was plastered with a new lime render through its full height. The timber lintels of all windows and doors were given new timber fascias. The two lower windows were also given new frames to act as plaster stops. The south door was recessed within the wall and a new projecting timber hood was provided to shade the door opening. Owing to the denial of Permanent Committee approval, it was not possible to make the opening for the north door during the period of work.

11.2 Interior:

The surface of the Comité wall up to the height of the former gallery of the church, and the returns of the wall to the sanctuary façade were smoothed with a lime/plaster fill and painted with a neutral beige lime wash and 'Primal' coating to prevent surface powdering.



Comité façade wall before [top] and after [below] intervention

12 Installation of new altar:

A new altar measuring 1.2 x 1.2 x 1.1 high [seen in photo in section 7, above] was constructed of plastered fired brick masonry in the center of the sanctuary. A 4cm Carrara marble top, with central cut-out, was installed on top of this structure.



Detail view of new Carrara marble altar top

13 Installation of a steel post and chain fence outside the east enclosure wall

In order to protect the east wall of the church from potential damage caused by vehicles parked in close proximity, a line of circular steel posts were set at a distance of 1.8m from the wall, linked by a continuous galvanized steel chain.



View of new steel post fence behind east wall of church