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Restoration of Amiriya Madrasa

Rada, Yemen

Conservator
Selma al-Radi

Client
General Organization of Antiquities, Museums and Manuscripts

Design
1983 - ongoing

Completed
2001 - ongoing

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I. Introduction

The Amiriya Madrasa was built by the last sultan of the Tahirid Dynasty at the beginning of the sixteenth century. It is quite a large *madrasa*, including several spaces that were probably private living spaces alongside a *masjid* and teaching rooms. The decoration, structure and form of the spaces are rich and varied. Extensive stucco decoration in *qudad* plaster and gypsum covers the walls and domes alongside tempera paintings.

The dangerous condition of the *madrasa* first prompted interventions to deal with the structural elements of the building, such as the walls and roof. This was mostly finished by 1987. Cleaning and restoration of the stucco decoration continues to the present day, with a team of experts form Italy restoring the paintings. The whole project is financed by contributions from the Yemeni and Dutch governments.

The project started in 1982 and completion is planned for the end of 2004. The *masjid* will then be opened for use by the inhabitants of Rada, and the rest of the building will become a museum under the Yemeni Government Organization for Antiquities, Museums and Manuscripts (GOAMM).

II. Contextual Information

A. Historical background

Yemen's earliest history, dating from the Stone and Bronze ages, has only recently been studied. For many years the region of Yemen was governed by a series of local rulers and the periods of their reigns overlap. Islam came to Yemen during the time of the Prophet. The rule of early Islamic governors (622–847) was followed by the Ziyadids (818–1018), whose centre of power lay in the Yemeni highlands, along the Indian Ocean coast and in Tihama, a predominantly Sunni area. Yufurid rule (847–997) was centred around Sana'a and spread to the north-west. The Najahids (1021–1156) were a black dynasty from Tihama and their rule spread to Zabid and northern Tihama. The Sulayhids (1047–1138), a Fatimid dynasty, ruled around Sana'a and Dhu Jıbla. The Sulaymanids (1069–1173) were a dynasty of *hasani* sharifs who ruled in the area of northern Tihama. The Zuray'ids (1080–1173) were a Fatimid dynasty centred around Aden. The Hamdanid sultans (1099–1173) held power around Sana'a. The Mahdids (1159–1173) ruled around Tihama, Zabid and Dhu Jıbla. The Ayyubids (1173–1289) were non-Arab Shafi'i Sunnis. It was not until the reign of the Rasulids (1228–1454), who were Shafi'i and Turkoman in origin, that Yemen was united under a central government. The rather short rule of the Tahirids (1454–1517) was stronger in the south around Miqran, Rada and Juban, and Ta'iz was the capital. Their major income was trade with India.

The Tahirids were Shafi–Sunnite, like the Rasulids. Initially Tahirid architecture continued Rasulid traditions, especially in the prolific construction of large decorated *madrasas* and mosques. The architecture of the period shows many sources of inspiration, including Anatolia, Syria, Iraq, Mamluk Egypt and, of course, India.

The Amiriya Madrasa was constructed by the last ruler of the Tahirid Dynasty, Amir Ibn ʻAbd Al-Wahhab (1489–1517). Rada became an important centre during his time and additional *madrasas* – the Ribat and the Bagdadiya – were built by Sultan Amir's uncle and one of his wives. Historians and travellers, as well as documents of the period, reveal that Sultan Amir enjoyed staying in Rada for extended periods. The major part of Rada was his *waqf*. It is assumed that the Amiriya Madrasa had several associated residential buildings and that Sultan Amir used the *madrasa* complex as a residence when he was in Rada.

The fate of the Tahirid monuments, including the Amiriya Madrasa, changed when the Zaydi ruler Imam Mutahhar took control in 1535–36 after two decades of turmoil. The austere Zaydis shunned the ornate Tahirid buildings; in most of them the decoration was covered or destroyed. The endowed *waqf* properties were confiscated, leaving the *madrasas* with no financial support.

The foundation inscription of the Amiriya Madrasa starts at the north-east corner of the *masjid* and is executed in carved plaster stucco: ʻThe construction of this blessed and auspicious *madrasa* was ordered by our lord and master and master of our affairs, our lord the greatest imam and exalted king…Salāh al-Dunyā wa al-Dīn, al-Malik al-Zāfir, our lord ʻĀmir, son of our lord the sultan al-Malik al-Mansūr ʻAbd al-Wahhāb ibn Dā'ūd ibn Tāhir, may his victory be glorious. The beginning [of the construction] of this blessed building was in the month of Rabī' I of the months of the year 910 of Hijra. On the owner the best of prayers and peace.' This date corresponds to August/September 1504. Although the date is inscribed in stucco, which would have been applied at the final stages of construction, the date notes the beginning of construction.

B. Local architectural character

For centuries Rada has been inhabited by a conservative and inbred tribal society. The local Mural and Gayfa tribes are known for their fierce and bloody feuds, which even involve tanks. Moments of truce between the two tribes are celebrated by shooting at the façades of the Amiriya Madrasa.

Archaeological finds date Rada back to pre-Islamic times, but it is mentioned in Yemeni chronicles only after the fourteenth century. Several monuments from the Rasulid and Tahirid eras are still standing or were torn down only in the last couple of decades. The town is located on the south of the castle, some parts of the town walls and entrances also stood until very recently.

Although the public spaces of the town are neglected and the loosely defined streets and open areas are littered with refuse, care is taken with the exteriors of the houses, which are decorated according to individual tastes. The main building material in Rada is mud brick. Volcanic stone in different colours is used on the first one or two floors of the houses as

roughly coursed or rubble-stone masonry. Mud brick and brick are used for the upper floors. Mud brick surfaces are mud plastered, whereas brick surfaces are left totally exposed. Coursing of mud bricks and bricks and the use of writing as part of the decorative repertoire are common features.

The houses are three to five storeys high, with frequent use of recessed blind arches, which reduce the dead weight of the walls as well as providing defined surfaces for decoration. The lower windows have double-wing shutters and are protected from sun and rain by sloping cantilever projections nailed to the frames above the openings. Most of the top windows are set in double or triple arches and filled with single panes of alabaster. In poorer houses the alabaster panes are embedded directly into the wall with plaster. These alabaster windows and others with coloured glass set in gypsum with geometric or floral designs create well-lit and intimate interiors. Roofs are flat with low parapet walls, accentuated by crenellations at the corners. A dish antenna is currently an inevitable feature of every roof terrace.

C. Climatic conditions

Yemen is divided into five natural regions that run parallel to each other in the north–south direction. A mountainous spine called the Highlands forms the central band, with altitudes of over 3,000 metres. Rada is located on a plain in a volcanic region almost at the edge of the Eastern Highland Plateau, at an altitude of 2,350 metres. There are two rainy seasons, between March and April and August and September. The rich volcanic soil and rains provide fertile ground for a wide range of crops, including fruits such as pomegranates and grapes.

D. Site and surroundings

Rada, is the most important town in the southern half of the Eastern Plateau and is among the more important centres of Yemen. It is about 160 kilometres southeast of the capital, Sana'a, on a main road that diverges at Dhamar from the road connecting Sana'a to the southern port of Aden.

Rada grew up around the only outcrop of rock in the surrounding plain and it is on this outcrop that the town's castle is built. The urban tissue surrounding the Amiriya Madrasa does not seem to include any houses that are contemporary with it. In the early 1980s, the *madrasa* was closely surrounded by other buildings that encroached into its grounds or even used its walls as part of their own structures. Some of these were removed during the first years of the project, including a large house used as a hotel about half a metre from the entrance stairs on the east side. At present, there are two three-storey stone and brick houses at a distance of about 4 metres from the east wall of the building. The more southerly of these has its south wall partially built on the balustrade of the stairs to the main entrance. A single-storey shop occupies the area between the two houses. A small cement-brick structure leans on the south wall of the first courtyard, and two other such structures are leaning onto the west wall of the second. All of these are expropriated to be demolished.

E. Topography

The Amiriya is surrounded by streets and the courtyards of existing or demolished houses. Some of these must have been constructed some time in the twentieth century because a photograph taken by H. Burchardt in the early 1900s shows a wheat field to the west of the building. However, this does not necessarily mean that the *madrasa* was constructed outside the town in the middle of agricultural land: it is at the foot of the castle and very near other *madrasas*, all of which were constructed before it. Rather, the houses in the area were probably built on or remained in large plots of cultivable land because the town constantly diminished in size and importance.

The original periphery of the Amiriya is very difficult to imagine. At present, only two sides of the building, to the east and the north, relate to the surrounding streets; on the other sides, beyond the boundary of the courtyard walls, the relationship with built-up and open spaces is very loose. Most of the houses in the vicinity have lost their courtyard walls and therefore stand in rather undefined areas without any discernable relationship with each other or any street. Very few of these houses are used and most have either collapsed or are in an advanced stage of dilapidation. There is a sweet slope from west to east and from north to south.

III. Programme

The Amiriya was in a very precarious condition when archaeologist Dr Selma al-Radi, then working as a consultant for the National Museum in Sana'a, visited it and was awed by the beauty and significance of the building as well as its deplorable condition. It was her initiative that started the project in 1982. Her intentions for the safeguarding of the Amiriya Madrasa overlapped with the proposal of Qadi Ismail al Aqwa in 1969 to give priority to the restoration of two Islamic monuments: the Ashrafiya in Ta'iz and the Amiriya Madrasa in Rada.

The Dutch Government, through its Technical Aid Ministry, was involved with a rural development programme for the Rada region. The restoration of the Amiriya Madrasa was included in this programme under the condition that the Yemeni Government provided matching funds.

IV. Description

A. Project data

What follows is a description of the Amiriya Madrasa noting some changes and alterations, as far as they could be detected from the available visual data. However, it is difficult to analyse a building that has been subject to several repairs at different scales and times now that the recent restoration is complete and the building covered with qudad plaster. From some angles everything looks original, while from others everything looks questionable.

Exterior:
The Amiriya Madrasa consists of built-up and open spaces. The *madrasa* proper, with its own interior courtyard, is located at the north. A front courtyard is situated on the south side of the building. It is not rectangular because there is an indentation at its southeast corner, providing direct entrance to the courtyard from ground level. A photograph taken by H. Burchardt in the early 1900s shows the remains of a partially collapsed wall running in the north–south direction and connecting to the main building at a point where the east porch meets the east tower. (The removed hotel building must have been located to the east of this collapsed wall.) To the south of the front courtyard is a second, smaller courtyard, connected at the southwest corner. The east wall of this second courtyard is also recessed, further reducing the size of the courtyard.

The building proper, without its courtyards, is a rectangle measuring 40 x 23 metres with its long side on the north–south axis. It consists of a ground and a main floor and two towers that mark symmetrical entrances at the southeast and southwest corners, each tower rising three storeys.

The basement like ground floor has several clusters of barrel-vaulted spaces at its centre with smaller spaces at the perimeter that can be accessed only from the outside. There is a *hammam* at the southwest corner. The first floor consists of several rooms of different sizes and a *masjid*, encircled by semi-open galleries.

The nature of the spaces is easily discernable from the elevations. At ground-floor level recessed arches house rectangular openings into the small perimeter spaces, which were probably shops. At first-floor level the galleries are defined by a series of arches, which rise from about 80 centimetres above floor level. All the rooms feature *mashrabiyyas* projecting from the windows. Important locations and spaces are marked by domes. The level of the pavement can be detected through the horizontal bond beams and the roof line by a projecting cornice topped by a continuous line of very ornate merlons. At ground-floor level the stone of the walls is exposed with bossed pointing, but the rest of the surfaces are plastered and all the surfaces are whitewashed.

The north façade faces in the *qıbla* direction. Five arched openings on the ground floor mark the shops, while four arched openings on the first-floor level relate to the gallery at the back of the *mihrab* wall. At the north end of each gallery are the *mashrabiyyas* of the domed corner rooms, and these rooms are also articulated with recessed rows of blind arches in three tiers.

On the east façade at ground-floor level an entrance is set between groups of four shops on each side. At the south corner there is a smaller fifth door, squeezed into the corner of the east porch. The main floor is entered from the south corner of the east elevation via a flight of steps leading to the east porch.

The west façade was originally similar to the east, but is now quite different because the corresponding stairs and porch on the west side are gone. Some of the shop spaces have also been absorbed into the interior accommodation at this level, so the shop fronts were converted to entrances. The northeast shop has two doors, one on each side, but this is not repeated at

the northwest corner because a vertical conduit carrying water to the first floor is situated there.

The east porch, at the top of the stairs, has arches on all sides; the east–west ones on the entrance axis being wider and higher than the north–south ones. The inner arch on the entrance axis opens to an entrance hall within a tower those projects from the southeast corner of the building. Two arches of the same nature lead to an open vestibule, which is set between the southeast tower and a corresponding tower projecting at the southwest corner. The entrance hall at the west has been walled-in to serve as a room. To the south, a continuous low wall with a built-in bench delimits the vestibule and two flights of steps lead to the front courtyard. The south wall of the main building has three doors, the central one accentuated by three rows of *muqarnas* over the opening and a *chatri* between the merlons at roof level. This forms the main façade of the building with a grand entrance.

First floor:
The main floor has two nodes: an internal courtyard to the south and the six-domed *masjid* to the north. Each of these major plan elements is surrounded by accompanying semi-open and closed spaces. The courtyard has a *riwaq* (arcade) of slender monolithic columns, with long rooms to the east and west and a staircase leading to the roof at the southwest corner. On the north side the masjid is at the centre of the arrangement with its related spaces around it.

The rooms to the east and the west of the courtyard are similar to each other with small variations. Each have four windows with *mashrabiyas* opening to the outside and four doors opening to the *riwaq*. Between the windows and doors are small niches, again four in number. Each room has a door opening at the north to the galleries around the *masjid*. The repetition of the openings, especially the doors, suggests that these spaces were originally planned to comprise four rooms but the partition walls were never built, with the exception of a division at the south end of the west room. Like the east and west galleries, these spaces are roofed with beams running in the east–west direction but their south ends are covered with domes.

The *masjid* is encircled by galleries on all sides. The south *riwaq* of the courtyard is shared with the *masjid* as its north gallery. There are domed rooms at the north corners of the east and west galleries. Similar domes are repeated at the south corners of the galleries but they do not denote separate rooms. This arrangement creates an ambulatory around the *masjid*, accentuated by domed spaces at the corners. The arched openings on all sides rise above a wall about 80 centimetres high, lined with a bench on which to sit and enjoy the view. In the north gallery there is an octagonal pool with running water that can be used for ablution, fed by water through a partially open channel from the northwest corner room, where a conduit at the south corner carries water from ground level. The conduit was originally embedded in a rectangular indentation and was not visible but during the restoration it was opened and is now visible, although the terracotta pipes are missing. The pool drains to the space underneath it. A photograph taken during restoration shows that the east side of the gallery had been partitioned to form a room.

The north *riwaq* is given particular emphasis as the entrance hall to the *masjid*, with a coffered stucco decoration on the ceiling. The *masjid* is a transversely placed rectangular space divided into six units by two rectangular pillars. It can be entered by several doors from

the galleries surrounding it – three to the south, two each to the east and west galleries, and two more, one on each side of the projecting *mihrab* niche, on the north side. A small cupboard is placed on each of the wall sections between the doors and photographs taken before the restoration show that these had plain wood wings. Stilted and slightly horseshoe-shaped four-centred pointed arches connect the walls and the pillars. The domes have quite high drums- incorporating the transition zones. Squinches rise from the walls and arches to form the transition to the six domes. The octagon created by the squinches is extended in height and the drums are also quite high. The domes have the same profile as the arches.

Roof:
The building originally had a staircase to the roof but the present one at the southwest corner does not seem to be the original one because the plaster at the south corner of the wall continues inside the stairwell, indicating that it was built later. The present staircase is built around a square core with entrance to the first and second-level rooms of the west tower from two landings. The roof has a number of different levels, all of which are lined with crenellations. The spaces spanned with beams have flat ceilings whereas domed spaces have low drums around them. Along the east and west lengths of the building three domes rise over the flat roof. All the domes have a finial of some sort. The domes over the *masjid* are stone with slightly profiled bodies.

The plan of the *masjid* rises about 3 metres above the roof as a rectangular platform, reaching about 4 metres at the top of the crenellations. A double tier of alabaster windows is set in this platform, those of the lower tier being round with truncated lower sides, and those of the upper tier being arched and interspersed with blind arched recesses to form a row of arches. Each dome has a low exterior drum and there is a narrow corridor between the domes and the crenellations.

The door of the two interconnected upper spaces of the east tower opens to the roof. The space over the porch is domed. A Burchardt photo shows a stubby minaret over the east tower, which was certainly a later addition. There are two missing merlons over the north wall of the space, near the west side. The break is large enough to accommodate a timber ladder used to climb to the minaret.

The *chatri* that crowns the south façade is at the centre of the south row of crenellations. There is a small baldaquin to the north-east of the dome of the east room. Its position in relation to the parapet wall and the merlons, the treatment of its cornice, and its encroachment on the dome all indicate that it is a later addition. One likely possibility is that it was constructed to serve as a minaret after the former one collapsed.

It seems that the towers at the southeast and southwest corners originally had spaces only on the first floor. This is suggested by the fact that the merlons of the roof continue around the towers at the first-floor roof level. The forms of the merlons are the same as those used elsewhere and the walls of the second-storey rooms facing the south open porch have been built by incorporating the merlons. The merlons are not present on the walls on the other sides of the towers and the east porch, which means that the upper rooms were constructed after these merlons collapsed at an unknown date. Apparently the three floors in the west tower were constructed for a second time after the collapse of the west porch. The original

volumetric articulation, in compliance with the importance of spaces, would not have allowed any secondary spaces to be as high or higher than the more important spaces. At the present, however, the towers are higher than the rooms on the main floor and the dome of the east porch is as high as the domes of the *masjid*.

Ground floor:
The ground floor is entered through a vaulted *iwan* underneath the landing of the double stairs of the veranda. There are two other entrances on the east and west façades at the two extremes of an east–west corridor running across the entire floor. There are roughly three clusters of spaces, all of which are intersected by a corridor running north–south. The first group comprises two interconnected vaulted spaces to the east and the *hammam* opening to them from the west. The second group consists of five barrel-vaulted spaces running east–west. Shops at the ends of these spaces were originally divided off from them but have now, in some cases, been incorporated back into the interior. This group of spaces ends with the east–west corridor. The final group has at its core a rectangular space with two rectangular pillars of unequal sizes, which are directly underneath the pillars of the *masjid* but much larger in size, acting as their foundation. This space has three doors onto the east–west corridor and is ventilated through slit openings with wood bars in the party walls with the shops on its east and west sides. The core is surrounded by shops on all the exterior sides, three each on the east and west sides and five on the north side. The shop in the middle of the north side, lying directly underneath the pool on the first floor, is reduced in size and has a cross plan because of the drainage of the pool.

The *hammam* at the southwest corner of the ground floor is a large rectangular space entered from both the exterior and the interior. The interior entrance, which is definitely original, is an arched opening with decorated *quadad* panels on its north wall. Two identical rows of cubicles are located along the south and north walls with partitions of about 1.40 metres high. A water channel runs in the east–west direction above and along all these walls, with a spout opening into each cubicle. Water enters the *hammam* through two slit openings on its west wall, just above the level of the channel and runs until the east wall of the space. Dr al-Radi has identified these spaces as showers with hot and cold rooms along the sides, as well as an ablution area.

The wall surface between the channel and the beamed ceiling is covered with decorated panels. On each long side, two columns, on the line of the inner walls of the cubicles, divide the span into four. The columns are of different shapes and sizes with decorated capitals. There is another channel at ground level, which was apparently filled with water at all times. This also circulates to all the spaces through openings in the walls, in the same manner as the higher water channel. Each cubicle has three levels. The first is level with the corridor that links the cubicles. There is then a step down onto a platform with a slit in the middle of it. The third level is that of the ground level channel, in which the water is collected. This channel has a drainage hole at the southeast corner of the south row of cubicles.

The construction joints on the ground floor, as well as certain irregularities, differences in the thickness of the walls, and the remains of undefined walls excavated outside the south end of the west wall, all indicate that parts of older structures were incorporated into the building during construction. The west door of the *hammam* on the ground floor is certainly a later

one, judging from the layers of *qudad*. It is likely that this door was opened up after the west porch had collapsed leaving the west wall of the *hammam* clear.

Courtyards:
Stairs lead down from the veranda to the front courtyard, which is dominated by a large, shallow cistern or pool. Because the ground slopes to the southwest differing numbers of steps descend into the cistern from each side – two on the south, three on the east, and five on the north. The east steps are flush with the east wall of the courtyard; there is a narrow platform on the south wall, and quite a wide, stone-paved platform in front of the stairs at the north. The pool is farthest away from the west wall and from this wall a narrow corridor leads to the second courtyard. A row of cubicles is situated on the west side of the pool. These must have been added later because they sit on the west wall of the cistern. They are not ablution spaces but toilets, as can be judged from the very wide openings on the west wall for collecting the dried excretion. In 2001 there were remains of domes covering them, which also suggests that they were toilets. The ablution area, with a row of faucets and small seats in front of each faucet, was on the west wall.

The northeast side of the courtyard has undergone several alterations and additions, which are rather difficult to interpret. The indentation on the east wall was made in order to accommodate a wide entrance to the building from ground level. The opening has been blocked and its present two-colour stone frame seems to be of a later date than the original structure. The section of the wall between the entrance and the east porch is made of coursed cut-stone masonry, whereas the rest of the walls are constructed with more roughly shaped stones with *qudad* pointing.

The opening to the second courtyard was blocked until 2001 and was opened during restoration. Its walls are used by buildings abutting them from the exterior; some openings and construction joints indicate to several interventions. There is also an entrance from the exterior to this second courtyard on its east wall. Its wall is lower than those of the first courtyard. There are two buildings inside the courtyard. One is a row of cubicles running in the east–west direction near the party wall with the first courtyard, with walls rising about 80 centimetres from the stone pavement. It is hard to judge when these were constructed without seeing what they were like before restoration. However, from comparisons with the *hammams* of several other *madrasas* and mosques, it seems that their location might be that of the original *hammam* of the Amiriya Madrasa because toilets were generally located as far as possible from the main accommodation to avoid unpleasant smells.

Near the south wall of the courtyard is a rectangular building with a flat roof and windows with round arches but no door. Inside, its walls are plastered and there is a water outlet with a raised stone underneath it on its west wall. The sills of the windows are about 1.4 metres above the level of the courtyard. This curious building perhaps served as a reservoir for distribution of the city water, constructed more recently than the original building and abandoned at an unspecified time.

Decoration:
Both structural and applied decorations are extensively used in the Amiriya Madrasa. All the domes on the main floor except those of the *masjid* are lobed. The two corner rooms at the

north side have circular lobes and the rest have faceted lobes, the plan of the domes being a polygon with folded sides. Other structural decorations include the tall and ornate merlons, the *muqarnas* projection over the main south entrance, and the tiers of recessed blind arcades on the north façade. Applied decoration includes carved gypsum plaster, carved *qudad* plaster and tempera paint, as well as the carved decoration of the doors and *mashrabiyyas*. An exhaustive variation of geometric, floral and calligraphic designs is used throughout.

The most ornate space is the *masjid*, which represents a climax of the type of decoration developed in Rasulid and Tahirid *madrasas*. Calligraphic bands of carved gypsum plaster run over openings and arches, delineating the structural elements as well as accentuating the importance of the spaces. A carved band also appears on the more important walls of the galleries, underneath the domes beside the walls of the *masjid*. Other floral and geometric designs decorate the *mihrab*, the intrados of the arches that carry the domes, and the intrados of the domes of the rooms at the north corners. A particular cast and carved decoration is used in the coffers of the north *riwaq*. Tempera painting on the intrados of the arches, squinches and domes of the *masjid* are the decorative highlight of the Amiriya Madrasa. The designs, utilizing a very wide range of patterns in basic colours, are said to be influenced by Indian textiles.

Qudad decoration is used both outside and inside – for the geometric interlace at the south side of the east elevation, the panels on the sides of the stairs leading to the front courtyard, and the various panels and individual figures around the platform on which the domes of the *masjid* sit, especially on the north side marking the *mihrab*. The decoration of the *hammam* on the ground floor is very fine and varied and is said to be unique in its quality and location.

Carved wood decoration appears on doors. Usually the exterior is more ornate than the interior. At present, only the doors of the *masjid* are original. The present *mashrabiyyas* are copies of an original.

Alterations and additions:
Two features particularly indicate that there have been many interventions in the building, both small and large in nature: the profile of the arches and the merlons. The arch profiles are pointed, sometimes two-centred and sometimes four-centred, sometimes stilted and sometimes horseshoe. Within each category no two arches are similar. Some variations may be the result of minor deformations or of loss of sharpness of profile because of the large number of *quadad* layers, or simply of mediocre workmanship of the *quadad*. But the arches of the Amiriya Madrasa display a much wider range of variations. Among the two-centred pointed profiles, the arch over the ground-floor entrance has a high lancet profile. The arches of the small wall niches on the ground floor are similar to this one. The arches of the shop entrances and the gallery openings to the outside are all a little different from each other, some of them stilted. The keystones of the rows of arches do not align horizontally as would usually be the case. Photographs of the *madrasa* before restoration show that the merlons too display a large variety, especially around the interior courtyard and the domes. Their height, thickness and form vary. A 1983 view of the north side of the courtyard documents four varieties alternating with each other, indicating small repairs at different times.

Use and condition of the building before restoration:
There is scarce information about the use of the building until the twentieth century. It was abandoned soon after the death of Sultan Amir when the Zaydi imams closed it down, believing the Amiriya prayer hall to be overdecorated and distracting for worshippers. We know that its funding from *waqf* sources was cut as well. Archaeological stratigraphy of the carved stucco decoration, where carpet bugs had settled, indicates a long period of abandonment.

The older sheikhs of Rada remember that the east rooms of the Amiriya Madrasa were used to chew *qat* (the leaves of a tree that, when chewed, produce a euphoric effect) in the afternoons but the roof in this area caved in some time around the 1930s or 1940s and it was not used any more. When the master mason, Izzi Gas'a, was a child, the building was the only school in town and he remembers students who came from out of town sleeping in the schoolrooms. The school was used until 1970. The *masjid* continued to be used even after the restoration started. The local community had electricity installed and put glass panes in the windows, which were eventually broken.

Squatters and poor people have lived in the *madrasa*, especially in the rooms on the ground floor. In recent times shopkeepers rented the ground-floor rooms for storage. New shops were built at the north end of the east wall. A *mihrab* was built on the corridor near the south entrance so that part of this space could be used as a *masjid* because it was warmer during the winter. This *mihrab* was torn down at the beginning of the restoration.

The Amiriya was in a very poor physical condition before the restoration. Except for the west façade, all the façades had sagging, bulging, and cracks on the walls in different degrees, the north and east façades being the most severely damaged. In most of the spaces with flat ceilings, such as the north gallery and the top room of the east tower, the ceilings had partially or completely collapsed.

The ground floor was badly treated by its users. The thickness of some walls had been reduced, some walls were taken down and people dug into the ground to make more storage space. The walls of the cistern in the front courtyard were cracked and water from it was leaking into the main square of the town. The walls of the *hammam* also had cracks.

The greatest and continuous cause of damage was the *quadad*, which had fallen off or cracked so that it was no longer waterproof. The long-established local habit of shooting at the building contributed to the breaking of the *quadad*. Missing doors and windows made the situation even worse. Water seeped into the building from the roof as well as the walls, weakening the bricks and reducing their structural reliability.

B. Evolution of design concepts

The extent of decoration, articulation of the superstructure, and variety of spaces in the Amiriya Madrasa are all greater than those of former *madrasas* in the area. This is particularly evident in the almost private quarters at the south of the building. Dr al-Radi thinks that this royal institution was meant to be used more as a palace than as a regular *madrasa* and this seems probable. It is the focal point of Rada and this is accentuated by the

articulation of its volumes and their accentuation by crenellations. However, it was designed more as a private building than a public one. It is inwardly focused around the two courtyards and the view beyond. It probably formed a more meaningful whole when the now-missing private buildings to the west and south of it were standing.

The pattern of circulation and the different size and quality of the spaces reflect the functions of a regular *madrasa* as well as the particular requirements arising from its use as a residence. This is also reflected in the clustering of the spaces on both floors, with common areas nearer the entrances and more specific spaces away from them.

The massing relates to two major factors: the span of a space – if it was wider than an ilb beam, the system had to revert to a dome; and the hierarchy of the spaces – regular spaces are covered with beams or barrel vaults whereas the more important spaces are marked with domes. Even among the domes themselves a hierarchy is evident in the height achieved by stilting and drums, their profile, lobing and decoration.

C. Structure, materials, technology

The Amiriya Madrasa is a masonry structure with vertical support provided by load-bearing stone or brick walls pierced with arched openings. One exception to this is the colonnade of the inner courtyard on the main floor, where slender columns of monolithic stone support the arches. These columns were reused from material brought over from India as ballast for ships and similar columns can be found in the *madrasa* in Juban, where they carry Indian motifs in their carved decoration.

Spaces with flat ceilings are spanned by the trunks or large branches of the ilb tree, which is the most suitable local timber. The domes are constructed of brick. These two means of covering spaces are used side by side or even in the same space in many building types, as in the east and west galleries of the Amiriya Madrasa. As far as can be observed from before and progress photographs of the *madrasa*, there are no timber rings for compression around the domes nor are there any elements to bond the two adjacent structural systems. This is why the walls of the exterior galleries opened up, causing first the collapse of the beamed ceilings and then the collapse of the dome.

Restoration:

The restoration of the Amiriya has a well-defined philosophy behind it, developed by Dr al-Radi based on her own experience and observations in developing countries, especially Yemen, and on restorations with which she is familiar, done by foreign experts in other countries. Yemen still has many traditional craftsmen practising their old skills, and those skills that have been lost can be relearned by working back through the production process. As Yemen is one of the poorer countries in the world, the programme had to keep to a modest budget. Foreign experts are expensive and some of their materials are questionable, such as the uncontrollable use of cement, so other methods of restoration had to be considered. The natural outcome of these conditions was to use local materials and techniques and local rather than international talent, and this has been the guiding principle of the restoration process.

The restoration will be discussed according to types of intervention rather than location within the building. Interventions progressed from the outside to the inside and in the interior several teams worked simultaneously on different parts.

Repair:
Most of what has been done at the Amiriya Madrasa is simple repair of elements that were either partly missing or in very bad condition. This has included the repair of several walls, such as the walls of three consecutive barrel-vaulted spaces in the centre of the ground floor, which were partly rebuilt. The replacement of *qudad* on the roof, the complete removing and replastering of the interior gypsum plaster and the exterior *qudad*, and the filling of the window openings with sheets of alabaster all fall into the category of simple repairs made with the same materials and techniques found in the existing elements. These elements might date from the original construction period or belong to a later addition, as is the case with the top room of the east tower.

This category of work also includes changing of structural elements. For example, when the *quadad* on the roof was replaced, it became apparent that almost none of the beams retained its supporting capacity. New beams were made using the traditional timber material, ilb, and the trees were chosen, dried and cut to the right size and dimensions. The new roof has four layers. The bottom layer comprises the beams placed at intervals of about 40 centimetres. Young branches from tamarisk trees, cut to about 70 centimetres in length, were placed perpendicularly on top of the beams, forming a thick and compact layer to fill the gaps between the beams. The third layer was mud plaster with straw added for plasticity and this was used to level and seal off the roof. The topmost layer was the *qudad* to waterproof the roof. The roof had to dry over six months, including at least one rainy season, before the *qudad* could be applied because the plaster is inflexible and would crack if the materials it is was in contact with were not completely dry or if the structure were unstable.

Consolidation:
One of first actions of the programme was to consolidate the foundations before intervening with the walls. A trench about 1.2 metres wide was dug alongside the north, east and west walls to check the condition of the foundations. After the foundations were repaired, the trench was dry-filled and packed with stones and diluted gypsum mortar (*sabba*) was poured over to bond the stones together. This type of low retaining wall (*bughla*) was a primary step before the consolidation of the walls. The condition of the east wall was so bad that the retaining wall had to be built first and the foundation consolidated later.

The east wall was strengthened by a technique known as ‘scucio-cucio’ – ‘unstitch-stitch’ – in restoration jargon, which involves working in very small sections. One stone is removed and the wall is supported by small props on the stones underneath. The infill and joints between are filled if necessary and the stone is reinserted in its place with new mortar. The space at the second level of the east tower had completely collapsed a long time ago and the wall here was consolidated before installing a new roof.

On the entrance arch of the east porch the master mason chose to use a process of *scucio-cucio* in preference to complete dismantling. The arch was deformed and bulged to the sides. Cracks had developed on the walls and on the extrados of the arch. Another lower arch of

stone was built within the existing arch to support it and the room above. The master mason started with the interior brick walls, which were four bricks thick, but when work began, the bricks proved to be unusable so the job became more a process of reconstruction without dismantling than one of stitching the wall back together with its own material. Throughout this process no shoring was used, only wedges and short props to support the parts above, which the master mason knew how to place so that they would carry the load.

The *hammam* in the second courtyard was treated as a case of archaeological consolidation. It was raised a few courses and consolidated to avoid further crumbling. Only a single layer of *quadad* was applied, because the restorers did not want to give the impression of a complete and finished work.

Complete dismantling and reconstruction:
The central section of the north wall had moved too far from the vertical to be stitched so it had to be taken down and reconstructed. An accurate survey of the façade was prepared to achieve a loyal reconstruction. The dismantled material was used as far as possible in the reconstruction but the majority of the bricks had to be changed because they had lost their strength. New bricks were made in Sana'a. The bond beams were repeated with new timbers, following the model of the original. Mud mortar and gypsum mortar were used alternatingly between the courses of stone. The wall was further strengthened by pouring diluted gypsum mortar to fill any possible cavities in the texture of the wall.

Reconstruction according to a model and subtle variations:
Few examples of carpentry were still extant and *in situ*. Those that were formed models for similar elements throughout the building, as was the case with the *mashrabiyyas* of the windows. The coffered stucco ceiling of the north *riwaq* was taken down and reconstructed, inserting a few original pieces to show what they were like. Its missing centre was designed by the stucco master. Where doors were missing, new doors, modelled after those found elsewhere in the building, were designed. Some doors, like those of the corner rooms on the north side, are dated to show that they are new. The plain winged niches in the *masjid* were replaced with wings decorated with geometric designs. The merlons are all one type; the rosette in the middle of the upper part is an addition. This continues a process that has gone on for centuries, with masters working in different materials and parts of the building using their inspiration to complement subtly the extant rather than directly repeating it.

Shoring and formwork:
Dr al-Rada notes that no shoring was used for the *scucio-cucio* process. Wedges and short vertical props of timber were used instead. This very old tradition may have developed due to a scarcity of timber. The arches of the galleries were filled during the intervention to provide shoring. The arches of the windows were repaired by filling them with masonry that reproduced the profile of the original. The arch could be constructed directly on this support.

Materials and techniques:
The restoration of the Amiriya Madrasa revived the process of production of certain materials and techniques for the use of others. Q*udad* is a mixture of lime mortar and crushed volcanic aggregate, producing a hydraulic substance similar to pozzolanic cement. It is used as stucco and plaster on exterior surfaces for the purpose of waterproofing. Q*udad* mortar was used for

many centuries but was abandoned after the introduction of cement and the master builders no longer knew how to produce it. A few of the older masons working on the Amiriya Madrasa vaguely remembered how to make *qudad* but could not remember the exact ratio of the ingredients, which was eventually found by trial and error. Some trials resulted in cracks that had to be repaired, but the long years of restoration also provided an opportunity for revising and perfecting the production and technique of application. Dr al-Radi published an article on the complete *quadad* experiment in 1987 in order to disseminate the information and *qudad* immediately began to be used in other restoration projects. For example, it was successfully used on Al-Abbas Mosque, also in Yemen, on the basis of the Amiriya restoration.

The production of the carved gypsum plaster was also revived. Selma al-Radi herself started to clean away the many layers of whitewash that covered the carved stucco of the building. (Although she has trained other people in this technique, she is still cleaning the plaster after eighteen years with ever greater precision.) Close contact with the material became a means to understand the technique of carving as well as the stages of production from beginning to end. This knowledge was used to experiment with the reproduction of a piece of the foundation inscription under the direction of the master Ali Abu al Futtuh al-Nasiri. Dr al-Radi published the process and results of this experiment in 2002.

Restoration of the wall paintings:
The painted decoration in the *masjid* of the *madrasa* covers an area of approximately 600 square metres. The Italian *Centro di Conservazione Archeologica* in Rome is restoring the paintings and this process has been designed to serve simultaneously as an intensive and applied course in the conservation of wall paintings to train the Yemeni staff of the Yemeni Government Organization for Antiquities, Museums and Manuscripts (GOAMM). The dual-purpose programme was formulated in 1988 and revised for implementation in 1999–2000 but it could not start until 2003 and is to be finished by the end of 2004. A comprehensive report on this programme has been prepared, giving the curriculum of the course and elaborating on the problems, techniques and materials involved in the restoration of the paintings. A detailed budged is included.

The course is intended for six employees of GOAMM who are already trained in the conservation of painted wood as a result of a similar process used for the Al- Abbas Mosque project. Theoretical courses in Rome for two months were to be followed by implementation at Rada.

The paintings were studied in order to choose the right technique and materials for the conservation. Careful study of the painted surfaces as well as several chemical analyses showed that a red paint was used to draw a perspective grid on wet plaster with a compass in preparation for the circular forms of the design. The red grid is easily visible underneath the final layer of paint and the compass marks are discernable in a raking light. The lines of the drawings were retouched and corrected with black paint at the final stage. The paintings were done in tempera using colours mixed with a binder, probably animal glue, applied on dry plaster. The composition of the colours was also identified through laboratory analysis: the yellow is yellow of tin and lead, the blue from azurite, and the red from red ochre with traces of cinnabar.

The major cause of damage to the paintings has been earthquakes that have destabilized the structure, causing the plaster to detach and water to infiltrate from the domes and the windows on the drums. There are cracks in the structure and in the stratification of the plaster, with failures near the arches as well as detachment of various amounts of plaster from the support. Flaking, separation of the colour, washing away of paint, loss of the paint layer and abrasion and scratching were observed. The surface of the paint layer also showed dust deposits, cobwebs, mud deposits, soot, whitewash and bird droppings.

The methodological principles that have guided the implementation of the treatment are as follows: conservation *in situ*; conservation of the status quo, with respect for the conservation history of the surfaces; compatibility of materials and techniques with the original; and use of recognizable restoration treatments with full reversibility. The phases of treatment include cleaning, pre-consolidation of loose plaster fragments, consolidation of plaster layers to their support and between each other, stuccoing lacunae, retouching with watercolour and pastels, and final protection. The report gives details of a set of technical operations for the maintenance of the paintings. The budget for the restoration of the paintings totals USD 925,000, of which USD 75,000 is allotted to the course in Italy.

Building services, site utilities:
Wet services are not yet planned as part of the project. The row of ablution fountains on the west wall of the front courtyard has been removed but not replaced with anything else. There are scaffoldings inside the *hammam* on the ground floor in preparation for structural interventions to the rooms of the west tower. The ablution and *hammam* activities may have been considered to take place outside the boundaries of the building. Their replacements may be combined with the facilities for visitors to the museum, who will mostly be tourists.

D. Origin of technology, materials, labour force, professionals

The interventions to the building, the decorations and the new facilities should be discussed as parts of a whole. Materials, techniques and construction technologies are all local and traditional and they have been revitalized by their use here. The local labour force is responsible for implementing these techniques.

A large part of the brick and stone used came from expropriated buildings around the *madrasa*. New bricks were produced in Sana'a. Lime was bought as stone, burnt in a kiln near the building and slaked in basins especially prepared for this purpose. Local volcanic cinder and tufa were crushed for use in the *qudad* mix. Ready-made gypsum of the best quality was prepared by the master mason for the plaster of the carved stucco.

Dr al-Radi was responsible for the choice of professionals. She consciously chose Yemenis for everything that could be done locally and used foreign experts and expertise only when such expertise was not available locally, as was the case with the Italian painting restorers and the Dutch firm used to design the exhibition.

V. Construction Schedule and Costs

A. History of the project

April 1982	Agreement between the Yemeni and Netherlands governments
1983	Yemeni funds were made available. The Awqaf dislodged squatters and paid compensation to shop owners. Compensation was also paid to the hotel, which GOAMM tore down.
1983–85	Jon Bjornson, architect, made plan and elevation drawings.
1983–88	The Koninklijk Instituut voor de Tropen in Amsterdam (KIT) was responsible for administration.
1985 onwards	The restoration was funded as part of cultural programme of the government of the Netherlands under the consultancy of KIT.
1989–94	There is no budget for these years, indicating that restoration ceased at this time.
1994–2004	The American Institute for Yemeni Studies was responsible for administration.

In 1997 Dr Selma al-Radi published a book on the restoration of the Amiriya Madrasa, documenting what had been done until that date. The basic structural repair was finished by 1987, except for that of the west tower, which will be completed during 2004 by GOAMM. The exterior *qudad*, including the roof and the elevations, was finished in 1996. The book lists a number of elements that remained at that time to be done, including cleaning two-thirds of the carved stucco, restoring the wall paintings using foreign expertise, manufacturing new doors, windows and *mashrabiyyas*, and cleaning and whitewashing the interiors.

The Reviewer visited the site three years ago, in April 2001, and at that stage the redone stucco coffered ceiling of the north *riwaq* of the inner courtyard – that is, the space in front of the entrance of the *masjid* – was being mounted. The *qudad* of the ground-floor pavement was almost finished and all the merlons were completed. The doors and windows were awaiting minor adjustments before being fixed into place. Cleaning of the stucco decoration was under way on the east and south walls of the *masjid*.

By 2004 the doors of the *masjid* had had multiple layers of oil paint removed and had been restored. Work on the periphery walls of the front courtyard and the *hammam* to the west had been completed, including the crenellations. The passage to the second courtyard at the south had been opened and the remains of the walls of the row of *hammam* cubicles in the second courtyard had been raised but not made full height.

The restoration of the paintings was formulated as a project in 1988, revised in 1999 and started in 2003, to be completed in 2004.

An exhibition on the restoration of the building has been designed and prepared by Architectbureau Jowa from Amsterdam. The exhibition panels have been shipped and are in their boxes in the *madrasa*, ready to be hung after the final cleaning of the ground-floor spaces.

B. Total costs and main sources of financing

The project budget has two distinctly separate parts: one for the building and one for the wall paintings. The project is largely financed by the Dutch and Yemeni governments, with relatively small contributions from a few other bodies and persons. The total budget is USD 1,682,700. Of this USD 731,000 comes from the Dutch Government and USD 929,700 from the Yemeni Government. About USD 22,000 was donated by other contributors.

There are a greater number of contributors to the restoration of the paintings. The World Bank through its Social Fund has contributed USD 286,300 – almost as much as the Dutch Government (USD 269,700) and Yemeni Government (USD 234,000). The other contributors are the Italian and US governments, with USD 100,000 and USD 25,000 respectively. The total budget amounts to USD 897,000, a little more than half of the repair budget. The total of both budgets is USD 2,679,000.

The Dutch Government has completed its commitments and is terminating its foreign aid programme to all countries, so after 2004 whatever remains to be finished will be carried out without any contribution from the Netherlands. The Yemeni budget utilizes World Bank funds through the Social Fund and this source may perhaps be used for the completion of the courtyards.

The budget breakdown given by the project director is based on the total of the two budgets. However, the cost of the restoration of the paintings is about one-third of the whole budget and should not be considered a regular item in restorations. The cleaning of the carved stucco should also not be part of the repair costs. It should be noted that the cost of the exhibition is also included in the restoration budget. If the costs for just the building are considered, the largest slice is spent on labour, complying with one of the key principles of the restoration: to use local talent, materials and techniques.

C. Comparative costs

No comparative examples are available. It would be especially hard to compare the costs of this project with another because it has continued over eighteen years, during which inflation has been astronomical. The division of the budget into small instalments, as well as frequent delays by the donors, has not allowed for efficient programming or for buying materials at cheaper prices.

D. Qualitative analysis of costs

No such analysis is available or possible, for the reasons given above. The total area of the ground and first floor is 1,840 square metres. To this, roughly 50 square metres can be added for the rooms in the east and west towers, raising the total to 1,890 square metres. Since work on the two front courtyards is not yet finished, only the restored walls and merlons of the front courtyard as well as one set of *hammam* cubicles in each can be added to the total. As they are not covered spaces it is more suitable for the calculation to give half the area, which roughly amounts to 95 square metres (half of 190 square metres). This means that 1 square metre of restoration, including the very labour-intensive cleaning of the carved stucco, costs a

little less than USD 850. When the restoration of the courtyards is finished the cost per square metre will be reduced.

E. Maintenance costs

No climate-control system is planned for any part of the building except the natural measures provided by the *mashrabiyas*, windows and doors. The building does not have any chimneys for stoves either in the original design or in the restoration.

F. Ongoing costs

It has been twenty-two years since the restoration started and it is still ongoing. In this extended period, maintenance has been carried out as necessary, as have small repairs. These include repairs to the *quadad* applied to the areas with flat roofs – that is, the east and west rooms on the first floor and the rooms of the east and west towers. Cracks develop at the interfaces between the two structural systems used side by side in the building – brick domes and wooden beams – due to the difference in their structural behaviour. The book published in 1997 on the Amiriya Madrasa refers to experiments with quadad and repairs to the flat roofs to resolve these problems.

Regular maintenance is a major concern and has already been planned, including the source of financing for such work. Since the building will be a museum under the control of GOAMM, the income of tickets sold to visitors will be put aside for the maintenance of the building, so the Amiriya will pay its own maintenance. It has already been agreed that a protocol be prepared on the use of the money for this specific purpose.

VI. Technical Assessment

A. Functional assessment

The ground floor of the Amiriya will become a museum with a permanent display of photographs of the restoration. The panels (2.40 x 0.60 metres) have photographs and text in Arabic and English to explain the history and the techniques used to restore the *qudad*, stucco, woodwork and paintings. Emphasis is particularly placed on the use of traditional materials and techniques. The ground floor will also have a material display on *qudad* and the west room on the main floor will be devoted to plaster, with the experimental reproduction of the foundation inscription on display. The *masjid* will be illuminated to highlight the decoration, especially the paintings on the domes.

B. Climatic performance

The basic approach of using traditional materials and techniques in the restoration also underlies the attitude to modern means of climate control. No new means of climate control have been introduced. Electricity has been installed in all spaces, however. The display of the paintings and decoration in the *masjid* as well as the panels of the photographic exhibition on the ground floor are specially designed.

C. Response to treatment of water and rainfall

Qudad is a perfect waterproofing material and has been renewed on all the exterior surfaces of the *madrasa.* In all countries affected by monsoons, torrential rains must be taken into account in the design process. In the case of Yemen, rains are the major source of water, collected in cisterns and used throughout the year, and roofs are designed so that water will drain from them as quickly as possible. Photographs of the Amiriya before restoration are not very informative on this issue. There is no sign of any gutters or spouts. However, in the restoration a careful sequence has been established for rainwater drainage, starting at the higher level of the domes. The rectangular platform on which the domes sit is encircled with a band of crenellations that prevent water from running down. To overcome this difficulty, slits have been opened at regular intervals at the foot of the merlons to allow water to drain. To control the flow, a gutter that is flush with the wall has been made in plaster on the surface of the wall. Over the beamed rooms and galleries, the *quadad* on the roof slopes towards the middle, whence it drains from spouts on the exterior walls. Gutters and waterspouts such as these are the traditional means of water drainage in any type of building in Yemen.

In the inner courtyard a slight slope directs water to the corner of the south *riwaq*, where it drains through a hole in the wall to the veranda. Water from the courtyard, as well as water that runs off the walls, drains through a hole in the east flight of steps leading down to the courtyard. All the original ground-level details were designed to lead water to the cistern that occupies almost the entire front courtyard. A hole at the base of the south wall of the cistern leads to a vaulted channel in the second courtyard running in the east–west direction, which apparently served the town and carried away floodwater.

D. Environmental response

The restoration of the Amiriya Madrasa did not include any factors to affect the balance of the natural environment.

E. Choice of materials and level of technology

Traditional materials and techniques have been used wherever possible but for some elements – for example, for the restoration of the tempera paintings – the safest and most developed Western methods were chosen. This very delicate balance was maintained throughout the restoration.

F. Response to and planning for emergency situations

The infrastructure project already implemented is expected to take care of surface drainage, including flooding.

G. Ageing and maintenance problems

Experienced labour is available for maintenance and a well-planned maintenance programme, complete with budget, has been prepared. Throughout the history of Yemen, monuments have

been preserved by continuous use and maintenance. The Amiriya Madrasa was, for a very long time, used only partially and became derelict and forsaken. Once it becomes a museum and the *masjid* opens to worshippers again, it will be in constant use again and the maintenance programme and budget will be in place to deal with this.

H. Design features

Since nothing new has been introduced, the pre-existing harmony and integration of the building with the site has not been disturbed but enhanced.

I. Impact of the project on the site

The larger infrastructure project that was planned and financed by the Dutch Government gave Rada a major boost. Many pedestrian ways were paved with stone. Streets suitable only for pedestrian traffic were covered with bitumen and vehicular traffic has very much increased. The streets encircling the east, north and far west sides of the Amiriya Madrasa are of this kind. When the museum starts to function, a parking area for tourist vehicles has to be planned, as well as a proper system for garbage disposal.

J. Durability and long-term viability of the project

The restoration of the Amiriya Madrasa, besides being well planned and carefully executed, has benefited from its long duration. This has allowed the results of trials and experiments to be checked and rechecked and repairs and maintenance to follow as a natural part of the process.

K. Interior design and furnishing

The project so far includes only the built-in carpentry. The only addition will be panels for the exhibition on the ground floor. Special lighting has been planned for the exhibition and a lighting project has been undertaken for the *masjid* and specially chosen fixtures are ready to be mounted.

Donations for carpets are expected for the *masjid*. The Review did not find any set policy for the use of the other spaces but many viable functions will doubtless come to the fore once the building starts to be used. For example, the ground floor has potential for several other uses besides the exhibition. When the shop spaces are rented they will restore vitality to the area.

VII. Users

The conservative nature and tribal social structure of this rather remote local town meant that its people were not ready to accept intervention to their major monument. In her book, Dr al-Radi relates several incidents arising from the opposition of the inhabitants, who even went so far as to imprison Dr al-Radi's counterpart, İzzi Muhammad Muslih, at the citadel. Evacuation of the squatters and of the tenants and owners of the expropriated buildings also created problems. The local people showed their interest and concern for the building by

closely observing what was being done, to the extent of forming an oppressive presence in critical parts of the building, which were threatened with imminent collapse. As the years passed a very good rapport has developed between Dr al-Radi and her team and the community. Over the course of the project more than 350 workers have earned their living from the Amiriya Madrasa and in many cases several generations from the same family have been employed.

Groups of local people, including women and children, constantly visit the building to see what is happening there. This interest is increased by the inhabitants' new curiosity to see with their own eyes what the tourists are coming to see. Their interest will increase further when the building is opened with a grand formal ceremony in November 2004 and the museum becomes operational. Only as inhabitants of nearby villages and towns visit the building will the real issue of the continuation of culture come to the fore.

Professionals have been observing what is going on very carefully and have been using the results of the experience for years now in both government restorations and restorations by foreign institutions. Al-Abbas Mosque is an example of this.

There is constant television and media coverage of the restoration project, both in Yemen and abroad. The BBC has made two films on it. Information on the monument and its restoration and discussion about what makes the Amiriya so special help the public to understand the complex nature of Yemeni culture in a broader context.

VIII. Project personnel

The client and Yemeni counterpart of the project is the Yemeni Government through GOAMM. Dr Selma al-Radi is the director of the project, representing the Dutch counterparts. In the first three years İzzi Muhammad Muslih and later Yahya al-Nasiri, both from GOAMM, have been her Yemeni counterparts.

Exhibition lighting, design and execution: Architectbureau Jowa, Amsterdam; director, Jowa Imre Kis-Jovak.

Restoration of the wall paintings in the *masjid*: Centro di Conservazione Archeologica, Rome.

Administration of the project 1983–88: The Koninklijk Instituut voor de Tropen (KIT), Amsterdam.

Administration of the project 1994–2004: American Institute for Yemeni Studies; directors, Dr Nora Sadek 1996–97, Marta Coburn 1997–2000, and Dr Christopher Edens 2000–04.

Directors of GOAMM: Qadi Ismail al Aqwa' 1983–88; Dr Yusuf Abdallah, since 1989.

Local staff from the General Organization for Antiquities, Manuscripts and Museums: Camillia Mohammad Ana'm, Abir Atef Radwan, Jamal Mohammad Thabet, Mohammad Abdel Wahab No'uman, Rashad al Qubati, Adel Said Mohammad, Ibrahim Ali Saad, Saleh Naji Utaif, Amin Saleh Mauri.

Site manager: Adnan Jamil Nu'man.

Site overseer: Abd al Rahman Fadhl Allah.

Stone master mason 1983–89: İzzi Mohammad Gas'a.

Assistant stone mason: Ali Sa'ad.
Masons: Abbdal Rizq, Mohammad İzzi Gas'a, Abdallah Dhafari.
qudad masters: Mohammad Ali Sultan, Abdallah Sultan.
Master carpenters: Abd al Razzaq al-Usta, Qassim Mohammad al-Usta.
Stucco masters: Ali Hamud Abu al Futtuh al Nasiri, Mohammad Hamud Abu al Futuh al Nasiri.
Electricity: Mohammad Abd al Wali.
Stucco cleaner: Mohammad Jarada.

Ayşıl Tükel Yavuz
May 2004

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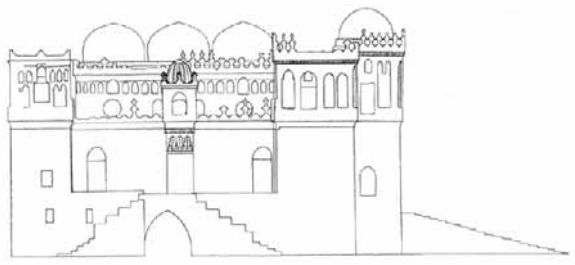
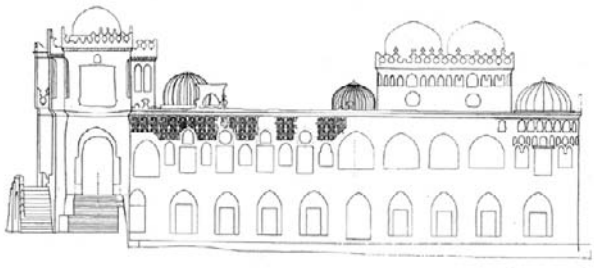
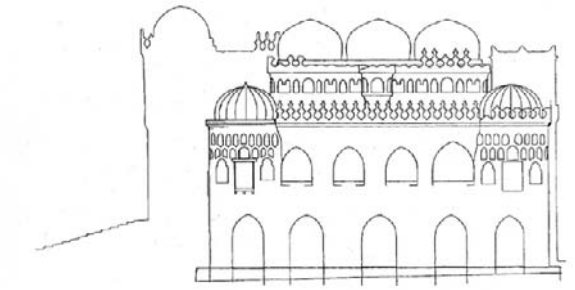


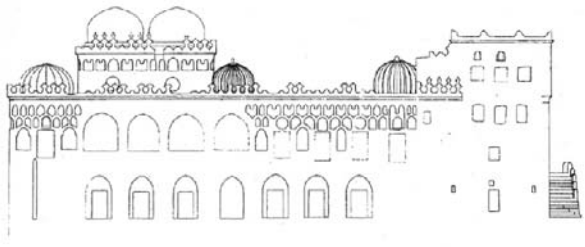
South elevation



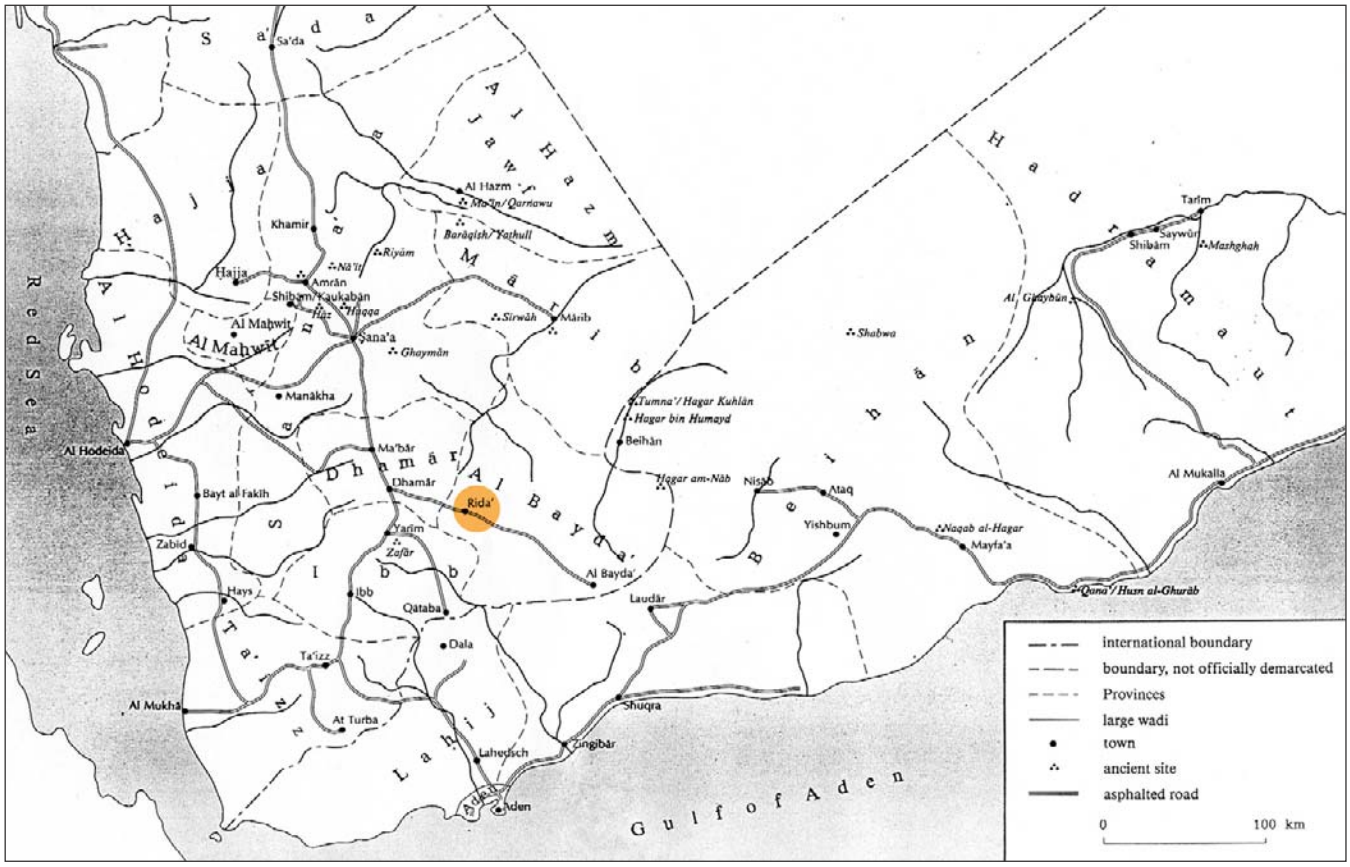
East elevation

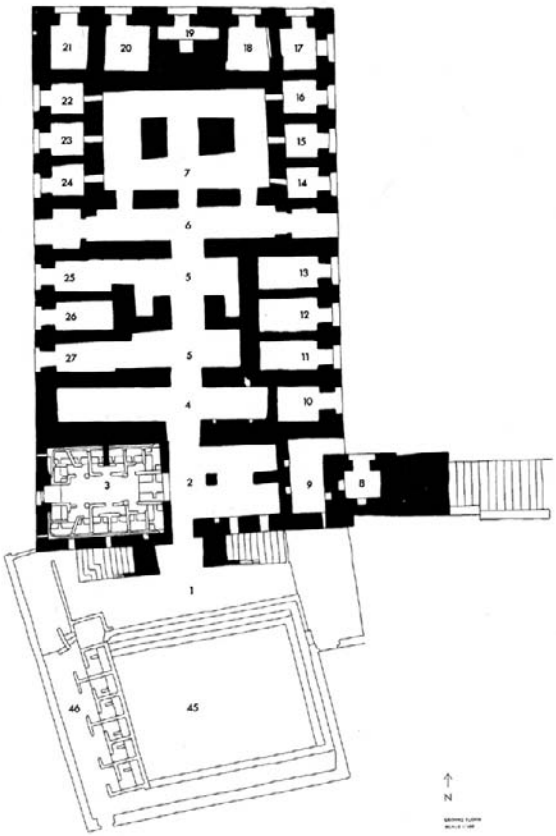


North elevation

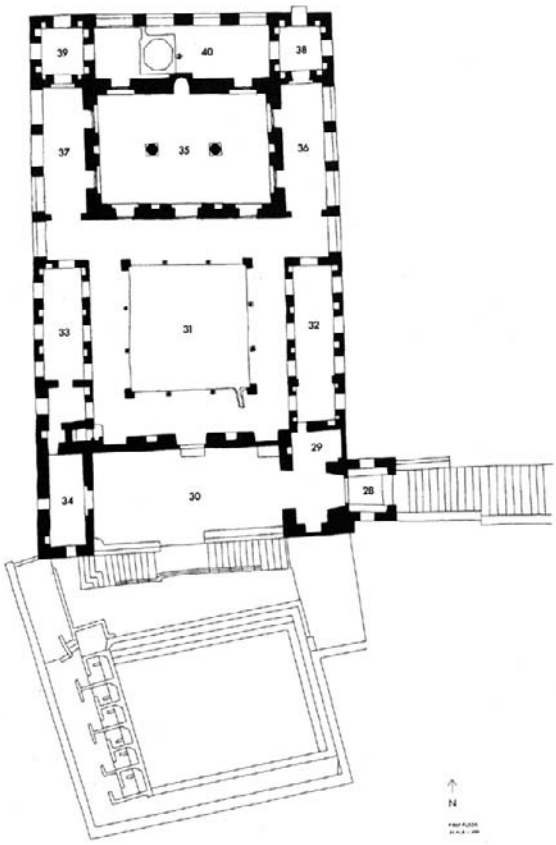


West elevation

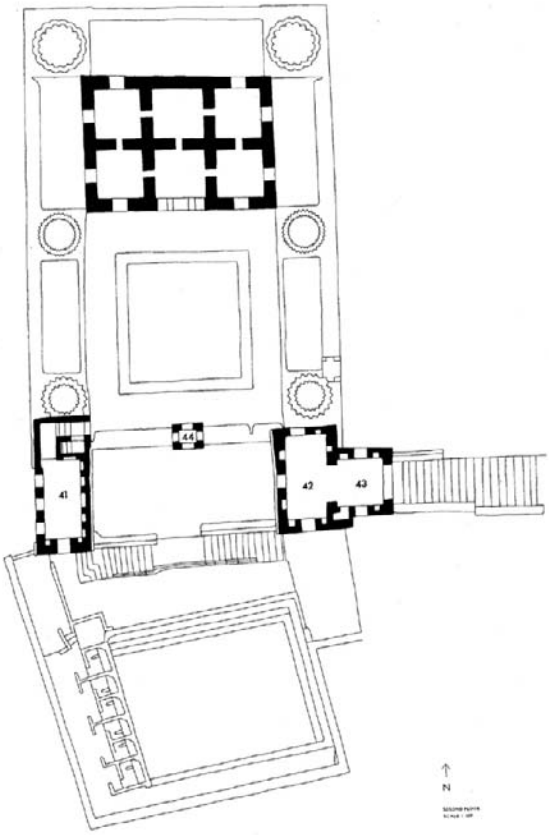




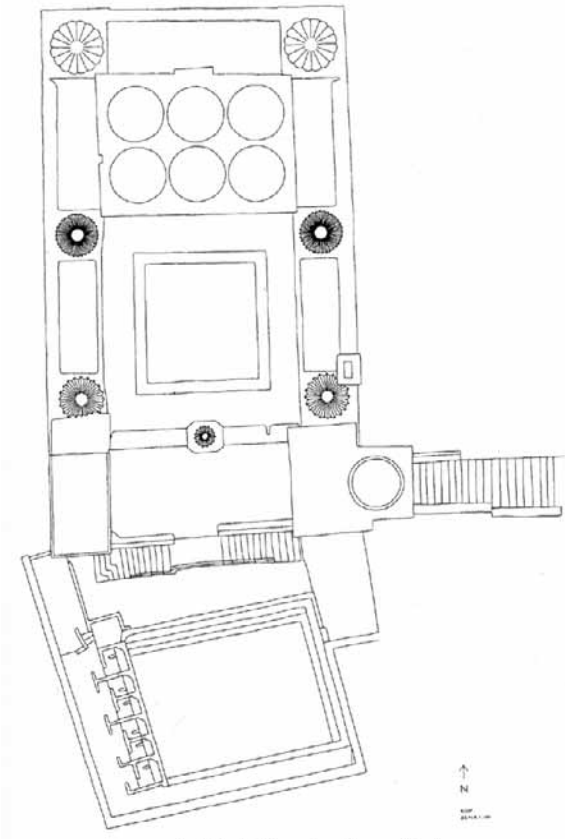
Ground floor plan



First floor plan



Second floor plan



Roof plan

The Amiriya Madrasa following restoration, in 2004.

The madrasa was in poor condition prior to the beginning of work in 1982.

View of the courtyard, looking towards the masjid; the prayer hall is located beneath the domes.

South gallery with stucco coffered ceiling.

The domes of the masjid are in stone; a double set of clerestory alabaster windows is set in the platform from which the domes rise.

Detail of the stuccowork in the coffered ceiling in the gallery surrounding the courtyard.

The Amiriya is characterised by a variety of vault and dome styles, all of which were covered with elaborate decoration. In the restoration, Italian experts helped to train Yemeni teams who will undertake restoration work on other monuments throughout Yemen.

Prayer hall of the masjid. After completion, the masjid will continue its function as a prayer hall for the local community; other parts of the complex will be installed as a museum and exhibition, with entrance fees used to ensure future maintenance.

One of the galleries located on the first floor, following restoration. All of the restoration techniques employed are fully reversible, and follow highest-standard international conventions, while drawing on and encouraging local craftsmen.

The exterior façades were completely restored, too, including the crafting of wooden mashrabiyyas.

View of the prayer hall during restoration.

Ground floor corridor after restoration, with carved quadad panels at the lower left.