

# Detecting Ideas of Rationalization in Mediaeval Islamic Building Design: The Case of the Rizk Cami

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Detecting Ideas of Rationalization in Mediaeval Islamic Building Design – what is the point of this investigation? To tell it straight away: it's about the interpretation of design under an economic perspective as analyzed in the case of the Rizk Cami in Hasankeyf. In this respect “rationalization” is not meant to describe the rule of ratio, proportions or other formal methods to produce design but a method of reducing efforts of planning and executing the erection of a building with monumental pretension<sup>1</sup>.



Fig. 1: View on Hasankeyf with the Rizk Cami (left), the bridge and the so-called ‘Small Palace’ on the edge of the citadel rock (photograph 2002).

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<sup>1</sup> Interdependencies of building materials, artisanal methods, construction techniques and design solutions under economic perspective have rarely been discussed by scholars dedicated to the field of historical Islamic architecture. Allen 1999, ch. 7 makes aware of the effect of standardized ashlar quarrying on the sober façade design of Aiyubid monumental architecture in Syria, Kolay and Çelik 2006 investigate the acquisition of stone material for the Süleymaniye complex at Istanbul. Prefabrication of stucco elements as integral parts of architectural decoration is broached the issue by Harb 1978 and by Ewert 1991.

Hasankeyf—its Arabic name is Hisn Kaifa—is a small town on the southern banks of the Tigris river in south-eastern Turkey about half way between the cities of Diyarbakır and Cirze (Djazirat Ibn Umar), characterized by its picturesque setting at the foot of a sharp cliff.

On the citadel rock and in the town there are at least five major mosque buildings<sup>2</sup>. Best preserved is the Rizk Cami situated on the shore of the Tigris river, next to the protruding citadel rock with the so-called “Small Palace” on its edge (Fig. 1). The mosque was built by the local ruler, the Aiyubid Sultan Süleyman in A.H. 811 (A.D. 1409), integrating the remains of an older building<sup>3</sup>. Meinecke suggested identifying the master of the Darraj Cami in Aleppo, Muhammad Ibn as-Sawwāf, with the master in charge for the erection of the Rizk Cami<sup>4</sup>. The building—on figs. 2 and 3 showed in its ruined state in 2003—was investigated in the years 2002 to 2003 by the author in the context of a joint project of the Istanbul department of the DAI, headed by Adolf Hoffmann, and the Hasankeyf Excavation under the direction of Oluş Arık<sup>5</sup>.

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<sup>2</sup> For the topography of Hasankeyf and its monuments see Arık 2003 and Gabriel 1940, I 55-82.

<sup>3</sup> Schneider 2008, 118-20, 129-39.

<sup>4</sup> Meinecke 1992, 149-50.

<sup>5</sup> The results of the investigation have been published by Schneider 2008 (in German), summarized in Schneider 2012, 127-46.





Fig. 2: View from the south on the Rizk Cami in 2003 (photograph 2003).

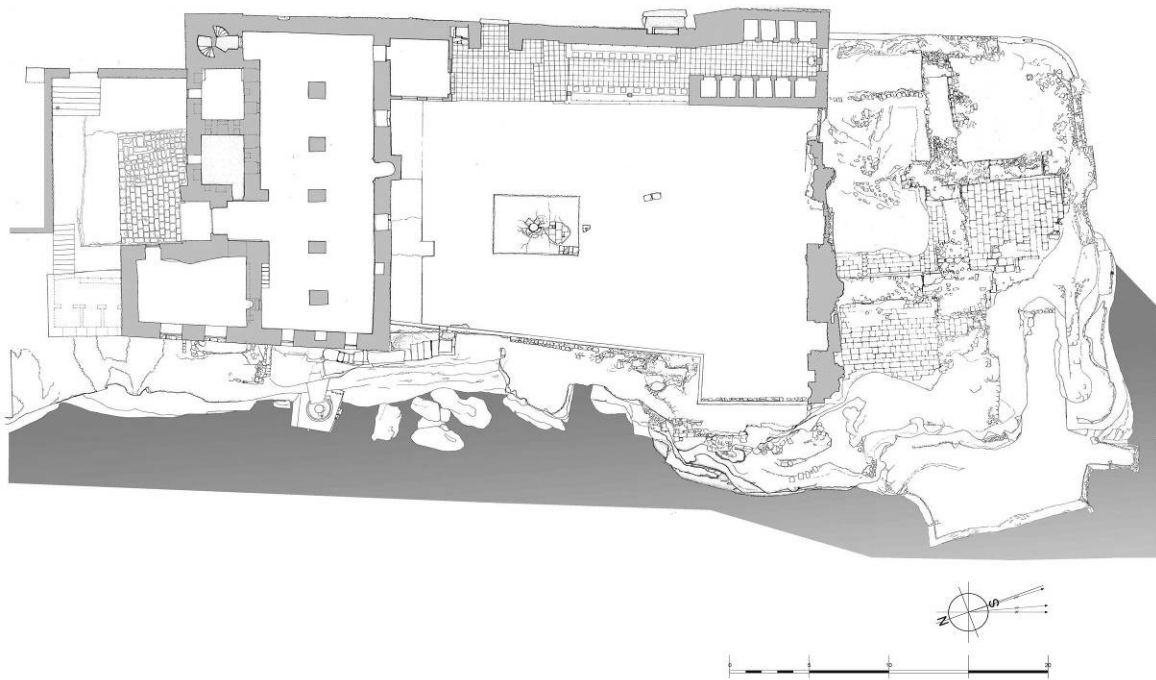


Fig. 3: Plan of the Rizk Cami in its state of 2003, M 1:333.

The layout of the original mosque building is as follows (see Fig. 4)<sup>6</sup>: Access to the complex is via a tripartite entrance on the north-eastern corner from the street leading to the main entrance which is situated at the beginning of the main axis of the building. Aligned along this axis is the entrance hall with a row of small chambers on both sides, then the court with a riwaq on three sides and finally the prayer hall at its southern end. Attached to the chambers towards the street is the minaret. The building enchants the visitor by the high quality of ashlar masonry and delicate decoration. This is still comprehensible by the remains of the main portal and of the courtyard façade and by the remarkably well preserved minaret, rising up to a height of more than 40 m. The ashlar masonry was chosen in general for the exterior surfaces visible from outside and from the courtyard.

<sup>6</sup> On the identification of the original layout see Schneider 2008, 125-27.

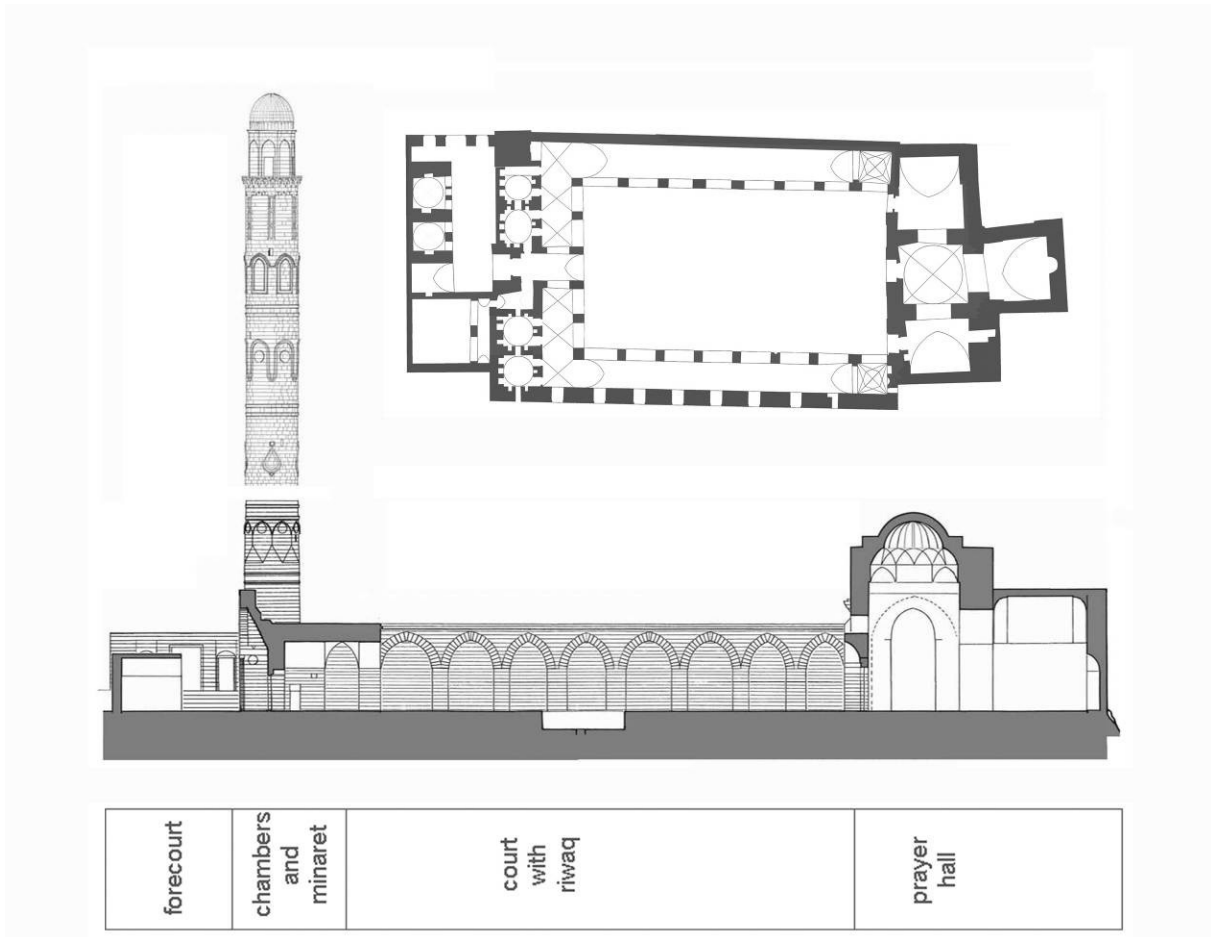


Fig. 4: Restored section and plan of the Rizk Cami as built in 1409 (based on Schneider 2009, plan 1c and 3c).

To learn about the concept of the building and the preconception of its execution, by analyzing the building's fabric, produced growing amazement. A considerable number of observations allow one to reflect on rationalizing thought as a fundamental attitude towards the design of this edifice. The definition of *rationalization* which is at the base of the following interpretation of these evidences has already been presented right at the beginning. *Rationalization* or *rationalizing* is understood as taking provisions for reducing efforts and maximizing visual and spatial effect. Efforts then are in particular:

1. Efforts of preparing the building materials
2. Efforts of developing design solutions for individual purposes
3. Efforts of matching the architectural aim of the overall concept

## Reducing Efforts of Preparing the Building Materials

The application of ready-made elements can be regarded as a basic concept in reducing efforts on the level of building materials. Prefabricated tubular elements appear in the construction of vaults both in the lateral chambers of the entrance part and on the rear side of the prayer hall facade. These tubular elements—or terracotta pipes—are cylindrical pots or jars of 14 cm in diameter and approximately 24 cm in length, produced by pottery workshops. The jars were laid out both in perpendicular and in parallel orientation towards the line of vaulting<sup>7</sup>.

An example of a vaulting executed with these jars is the covering of the most eastern chamber (Figs. 5 and 6). The chamber is approximately 3.30 m long and about 2.60 m wide. It is covered by a combination of a narrow bit of a pointed barrel vault towards the minaret, and by a small dome of 2.17 m in diameter, supported by squinches. All these vaultings, except of the first part of the dome, are built with the tubular elements aligned in a snail-like course up to the top with the jars in perpendicular orientation to the surface of the vaulting. Using fast hardening lime mortar they can be laid out without any centering. Still intact as well is the dome over the neighbouring chamber to the west, whereas the vaultings of the chambers in the western wing of the entrance section have vanished. But as their layout was almost identical to the chambers of the eastern wing they would have been covered by the same construction. At the prayer hall remains of the tubular construction indicating barrel vaults are found on both sides of the central room of the prayer hall (Fig. 7). Most probably, the southernmost part of the prayer hall, which nowadays is completely destroyed, was also vaulted in the same way.

The technique of using this kind of ceramic jars is typical for the construction of mediaeval buildings at Hasankeyf. At other major monuments in Hasankeyf, tubular vaultings still can be found intact<sup>8</sup>. In combination with a particular type of roof supporting structure of rubble stone ribs, the effects of weight reduction and thermal insulation are fully taken advantage of. From an economic point of view, these ready-made parts were far less time consuming in preparation than ashlar vaultings, which would have needed additional centering. Rubble constructions would have required a centering too. In terms of labour organization the task of preparing the materials can be delegated to other groups of artisans, especially when masons are hard to find. Apart from all these economic advantages directly related to the construction, the commission of large quantities of ceramic products may well be interpreted as an economic stimulus for the evolving ceramic industry in Hasankeyf. This might in fact have been a concern to the building's patron in particular<sup>9</sup>.

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<sup>7</sup> See Schneider 2008, 97-101.

<sup>8</sup> E.g. Arik 2003, fig. on p. 98 (Small Palace), fig. on p. 165 (Koç Cami), fig. on p. 179 (Sultan Süleyman Cami).

<sup>9</sup> About Sultan Süleyman see Schneider 2008, 154-56. The construction of vaultings with jars is well known from Byzantine context as well as from Islamic buildings in Anatolia (Milet, Tekke, see Wulzinger et al. 1935, 39-40, pl. 12; near Eskişehir, Ekmek-evi, see Wulzinger 1913, 45; Selçuk, bath building, see Niemann 1906, 125-26; Diyarbakır, Hasan-Pasha Han, see Sözen 1971, 63, Istanbul, Süleymaniye Cami, see Yurttaş 1991, 377 n. 12) and Iraq (Baghdad, Abdülkadir-Geylâni, and Musa Kâzim-Küllüye, see Langenegger 1911, 17-19, 93 and Uluçam 1989,



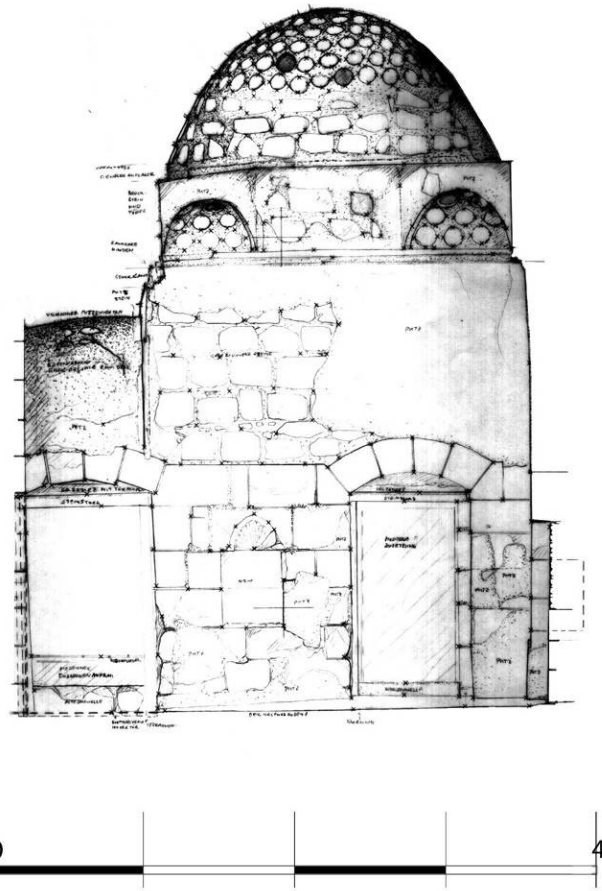


Fig. 5: Photomontage of the dome in the eastern most chamber of the entrance section, and Fig. 6: Section of the eastern most chamber viewing on the southern wall (DAI, H. Lehmann 2002)

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31-40). A specific point of interest concerning the Hasankeyf example is within its relation to all other examples known so far. All the other Islamic buildings featuring tubular vaultings are younger actually or were realized in Western Anatolia with their respective building history still not investigated or published in detail: it is still possible that the parts built with jars pertain to later modifications. On the other side, the connection to Byzantine traditions in terms of origin remains obscure, links are missing. Hence, the question becomes, how is it exactly that this technique spreads in the realm of Islamic architecture from the middle of the 15<sup>th</sup> century onwards and what is the rôle of the Hasankeyf workshop within this development? The evidence as given in the literature is summarized by Schneider 2009, 97 n. 159.

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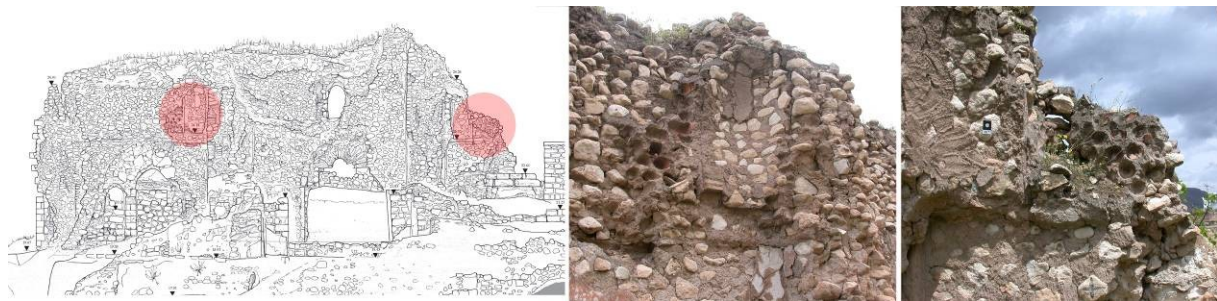


Fig. 7: Tubular vaulting at the inner side of the prayer hall façade.

Prefabrication is also present in the plaster decoration of the prayer hall, especially in the execution of the central dome. Several elements of prefabricated muqarnas cells made from stucco were found in the course of excavating the prayer hall (Fig. 8)<sup>12</sup>. They are similar to those described by Harb in the context of Ilkhanid buildings<sup>13</sup>. The cells were prepared by using cast forms at a limited number of form types defining the design of the final composition of the dome decoration. Using quick hardening lime mortar the elements were set in place on the inner surface of the tubular vault construction. A complete example for such a dome decoration is still

<sup>10</sup> E.g. Arık 2003, fig. on p. 98 (Small Palace), fig. on p. 165 (Koç Cami), fig. on p. 179 (Sultan Süleyman Cami).

<sup>11</sup> About Sultan Süleyman see Schneider 2008, 154-56. The construction of vaultings with jars is well known from Byzantine context as well as from Islamic buildings in Anatolia (Milet, Tekke, see Wulzinger et al. 1935, 39-40, pl. 12; near Eskişehir, Ekmek-evi, see Wulzinger 1913, 45; Selçuk, bath building, see Niemann 1906, 125-26; Diyarbakır, Hasan-Pasha Han, see Sözen 1971, 63, Istanbul, Süleymaniye Cami, see Yurttaş 1991, 377 n. 12) and Iraq (Baghdad, Abdülkadir-Geylâni, and Musa Kâzım-Küllüye, see Langenegger 1911, 17-19, 93 and Uluçam 1989, 31-40). A specific point of interest concerning the Hasankeyf example is within its relation to all other examples known so far. All the other Islamic buildings featuring tubular vaultings are younger actually or were realized in Western Anatolia with their respective building history still not investigated or published in detail: it is still possible that the parts built with jars pertain to later modifications. On the other side, the connection to Byzantine traditions in terms of origin remains obscure, links are missing. Hence, the question becomes, how is it exactly that this technique spreads in the realm of Islamic architecture from the middle of the 15<sup>th</sup> century onwards and what is the rôle of the Hasankeyf workshop within this development? The evidence as given in the literature is summarized by Schneider 2009, 97 n. 159.

<sup>12</sup> Schneider 2008, 108-10, 234-36 n. 2 and 5.

<sup>13</sup> Harb 1978.



preserved in the nearby Sultan Süleyman Cami<sup>14</sup>. The date of the latter dome is still under dispute. Meinecke dated it to the middle of the 14<sup>th</sup> century, but because the cells from the Rizk Cami are definitely connected to the building of 1409, it should be feasible to suggest a corresponding date for the dome of the Sultan Süleyman Cami<sup>15</sup>. From the economic point of view, the possibility of delegating and spreading specialists work is surely the point—in comparison to the alternative commission of an ashlar dome with refined surfaces.



Fig. 8: Muqarnas cells found in the course of the excavation of the prayer hall of the Rizk-Cami.

### **Efforts of Developing Design Solutions for Individual Purposes**

Furthermore, the use of standard elements reduces the efforts for individual design. This leads to the second point of the building's evaluation, dedicated to the reduction of design efforts by applying type design of different sorts of detail. This is relevant in particular again to the side chambers of the entrance part and to the minaret.

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<sup>14</sup> Arik 2003, fig. on p. 182; Schneider 2008, fig. 86; pl. 55d.

<sup>15</sup> Schneider 2008, 124-25.

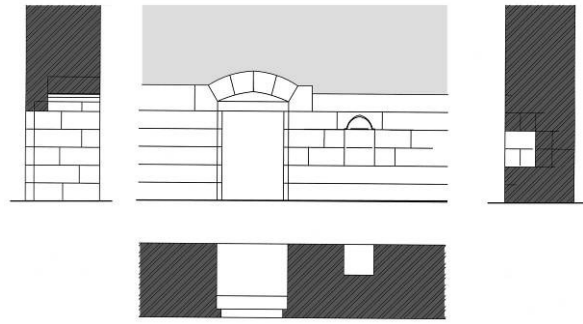


Fig. 9: Schematic drawing of the standard design for the doors and niches of the entrance section.

Repetitive use of type design is evident in the construction of the entrance section. The walls of the chambers, in general, display identical dispositions of the walls with door or window openings and niches. But not only is the distributional pattern of the different openings almost identical in all chambers. Also their execution follows a standard design for each category of opening, iterating the typical solution in nearly all incidences (Figs. 5, 9 and 10). The definition of the niches even includes their decoration with a palmet carving in the centre (Fig. 10). Thereby, identical design shall not be mixed with standardized execution; all blocks were executed individually with slightly variant measures. But nevertheless they all follow up the same standard design. In spite of iterative application of the same design, variations occur on the level of execution both in individual measures and ornament. Serial production of standardized blocks with identical measures was not the point; rationalization here refers to the reduction of individual design for every opening. Developing a standard arrangement of ashlar allowed the more experienced masons to delegate further execution to masons with lower qualification, the execution of one specimen by the former given as instruction to the latter.

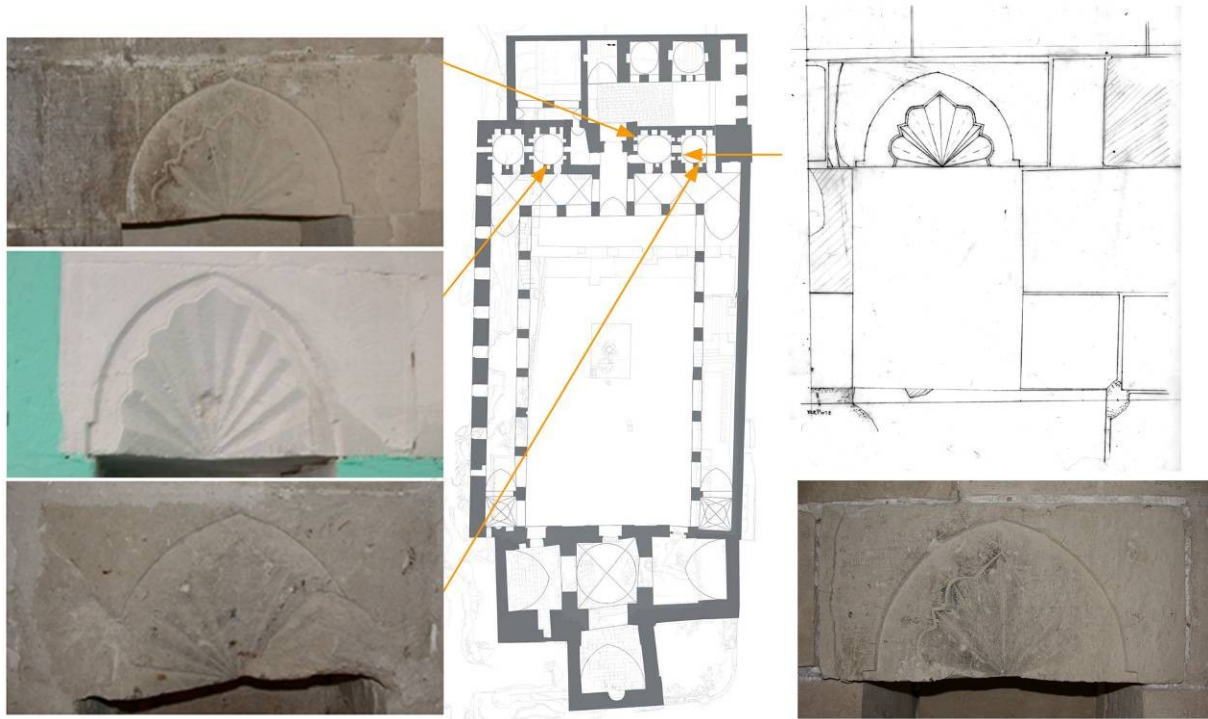


Fig. 10: Different examples for the execution of the standard niche lintel model.

Hence, the standard design applied for all of the 284 stairs of the minaret can be interpreted in the same way. Roughly 95% of the stairs follow the same standard type with particular elaboration of the recessed vertical riser that allows climbing conveniently the intertwined double staircase (Fig. 11). The remaining 5% of the stair blocks were individualized in shape due to the particular situation at the entrance level.

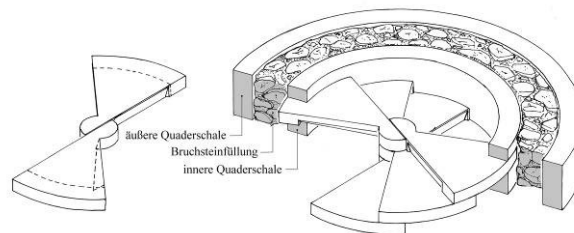


Fig. 11: Schematic drawing of the standard design for the stair blocks of the minaret staircases.

Another element of the minaret's design defined by types is represented by the eight window slits bringing light into the intertwined, doubled staircase of the minaret. In this case not only one type had been applied but three (Fig. 12 left). The choice of three different types instead of a single type seems to thwart any idea of rationalization. In fact the use of distinct types for the same task points to a characteristic of the overall concept to be recognized at several incidents.

This characteristic can be fixed as interplay of categorization and variation as it becomes evident by the evaluation of the exterior design of the minaret.

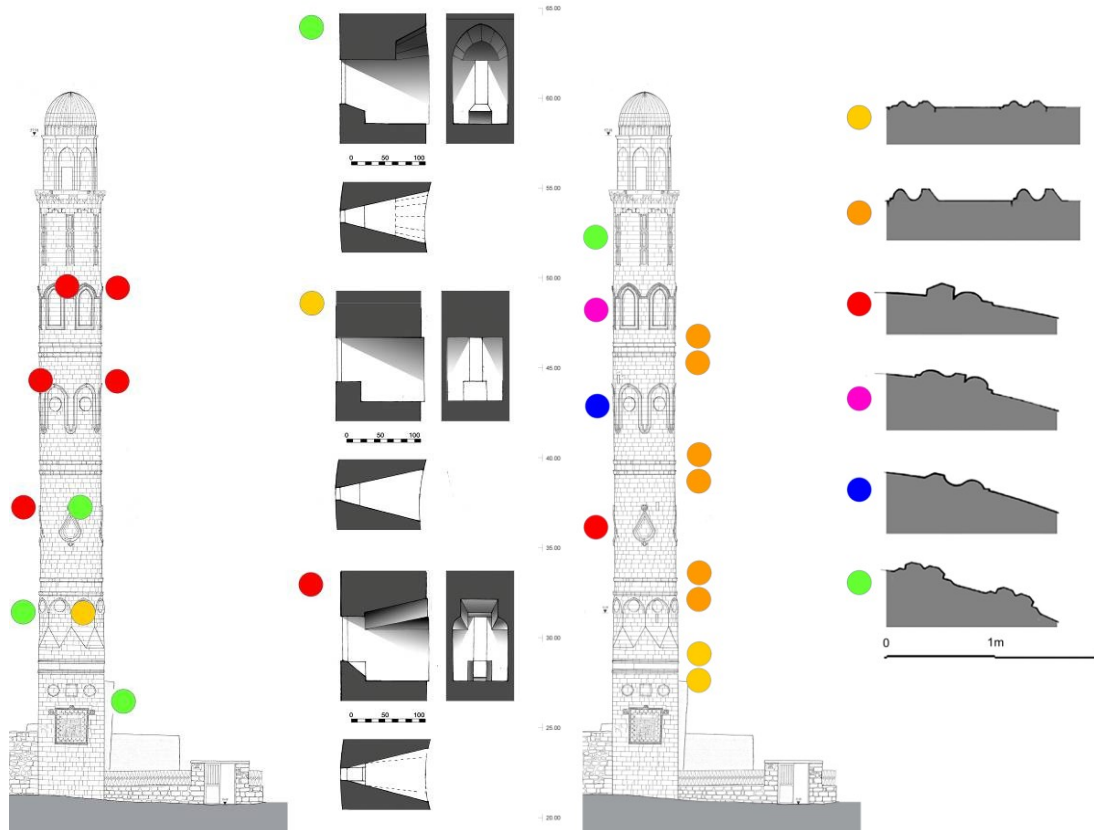


Fig. 12: Distributional pattern of the three types of window shaping (left) and of the different types of moulding form (right).

The minaret owes its opulent effect mainly to the overwhelming wealth of decor and ornament. As parts of one group of decorative elements a lot of mouldings are to be found along the shaft. Some of them separate the different sections and some frame the plaque-like decorative applications filled with ornamental carvings. The framing mouldings are restricted to their particular decorative element that is distinct in each section of the minaret shaft. The profiles of the separating mouldings, however, iterate the same profile and furthermore, they are even doubled by repeating the same profile on the upper and on the lower edge of the decorative bands. Turning our view to the medallion decor, applied to the plain surface of the shaft, we find the minaret again designed not by numbers of individual creations but by repetitive use of identical cartouches. The eight medallions in the octagonal zone of transition are of the same particular shape, size, and arrangement. So are the four drop shape medallions, the six medallions with their canopy like garland of the next section, the six blind windows in the one above, and the six panels divided by plaited mouldings on top. Instead of 30 individual decor



elements their number is reduced by type to five different cartouches with corresponding framing. The analysis of the shapes and of the arrangement of the blocks reveals that any type of these decor arrangements shows an identical relation to the shape and arrangement of the ashlar bearing the complete device.

The iterative design of the type-blocks, as can be observed for all sections of the shaft, may be illustrated here just by the mapping the joints of the eight medallions with a canopy on top at the octagonal part of the minaret's base (Fig. 13). The medallion is distributed basically on five blocks arranged in three layers. The width of the lower block (block no. 1) is defined by the intersection of the medallion circle with the upper edge of the third layer. The blocks of the second layer (block no. 2) are joined at the middle axis of the decor and the medallion's upper edge coincides with the upper edge of the uppermost block (block no. 3). As the blocks of the upper two layers bear the moulding of the canopy too, two versions are required here for either side of the medallion.

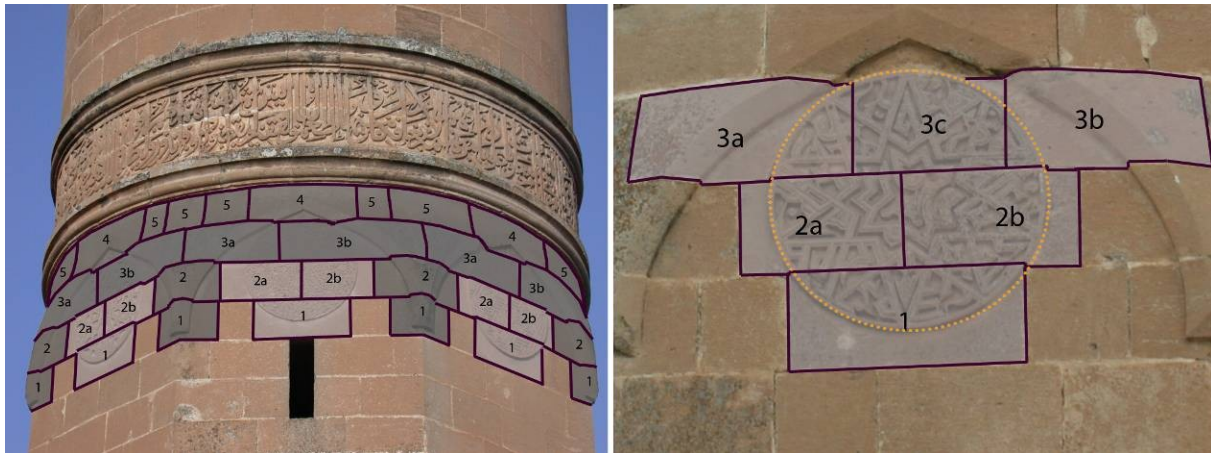


Fig. 13: Mapping of joints and ashlar shape at upper part of the transition zone from minaret base to shaft with medallion décor and canopy moulding (left), detail (right).

The blocks no. 2a and 3a feature the corresponding section of the canopy to the left, the blocks no. 2b and 3d the section to the right. In this way, the blocks no. 2 and no. 3 are part of the canopy arrangement at the same time. The arrangement of the canopy on the other hand consists of six different type blocks distributed to four layers. Here the blocks no. 3a and 3b share the same section mirrored to each other. The blocks no. 1 and no. 2 are at the same time part of the neighbouring rappings of the canopy. This means that the preconception of the medallions combined with the canopy made it possible to restrict the effort of stereo metric design to only 10 blocks plus one block for the corners of the octagon below and another one for the plain surfaces. Eightfold replication resulted then in an opulent appearance. In the end the 10 decorated blocks serve as a template for the remainder of the 104 blocks (idealized with block no. 5 of the canopy featuring four times within the rapping) comprising this section of the minaret. The ratio of 104:10 might then be taken as some sort of factor for describing the reduction of

design effort to be spent by a master, sufficiently capable of stereochromic tail lure. In restricting himself to the execution of typical models, the master mason was able to delegate serial execution to masons less experienced in design. The same strategy of execution is valid for the rest of the minaret shaft too – certainly with changes in the particular ratio. If a proportion of 2:1 is still estimated as relevant, this interpretation of the execution might as well be extended to the muqarnas vaults on the three portals at the main entrance and at the courtyard façade of the prayer hall, all of them carved in the same limestone and designed symmetrically.

After all, the overall aesthetic concept did not follow the aesthetics of mere iteration but displays again—as was the case with the windows above—variation: by applying different motives to the surfaces of the medallion cartouches, a high degree of diversity was met. This can be illustrated by the two drop shape medallions and their cartouches filled with different motifs. But at the same moment the variation is restricted to one half again as both the arabesque drawing and the image of the flowers ascending from a vase were (Fig. 14) adapted twice. The same is true for all the other cartouches as displayed in fig. 15. This means that a number of 33 ornamented applications were reduced to only 17 different motifs of highly varying geometrical, vegetal and epigraphic ornament<sup>16</sup>.



Fig. 14: Mapping of joints and ashlar shape for the drop shape medallions.

<sup>16</sup> For the motives in question see Schneider 2009, Dekor Nr. 8, 9, 11, 13, and 14.

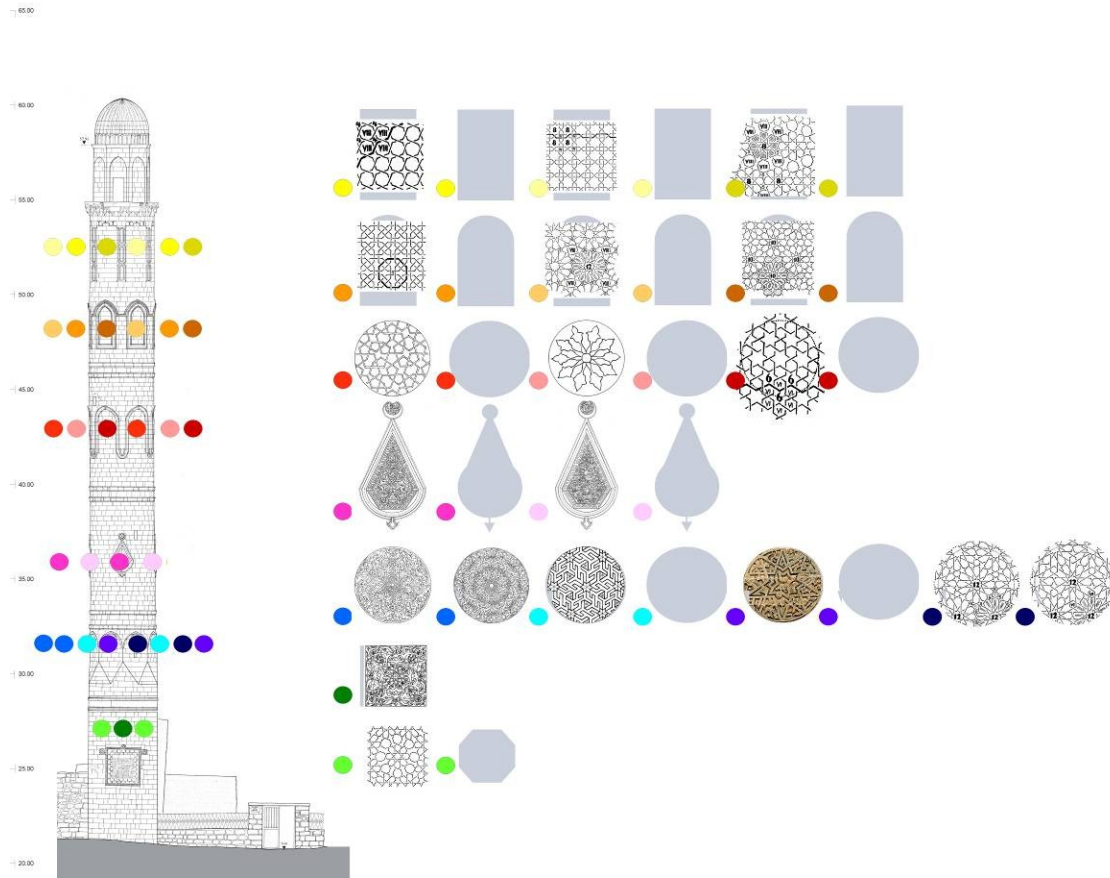


Fig. 15: Distribution of medallions and motives along the shaft of the minaret.

### Efforts of Matching the Architectural Aim of the Overall Concept

As the final level of design the overall layout of the building and the architectonic idea which was the major aim of all efforts shall be taken into account as well. On the level of overall layout we may recall the rigid axial and symmetrical arrangement of all parts of the building, clearly focusing on the heart of the building, namely the central part of the prayer hall with the dome and the mihrab at its southern end. At first glance this arrangement seems self-explanatory and first choice looking at the building site (Figs. 2, 3 and 16 left). The site was not a plain area in the country side but in fact a long and narrow strip within the urban texture limited by the street on the eastern side and the steep cliffs towards the river on the western side. Additionally, the rock upon which the mosque was built was perforated by caves that supported the erosion of the terrain in subsequent times. And at the southern end of the site the remains of an older building were not removed but integrated into the new complex transforming the existing structure into the prayer hall of the mosque.



Fig. 16: The site of the Rizk Cami (left) and view on the Rizk Cami coming from the north (right).

On the second glimpse this straight arrangement is not as self-evident as it may have appeared before. Compared to the location of the main portal at other Mamluk style buildings of the period in south-eastern Turkey and in Syria, we see that the main portal in general is oriented towards the street accessing the building<sup>17</sup>. In general, the monumental design of the portals drew one's attention within the urban context. The same is true even for all the other major monuments in Hasanköy: the so-called Ulu Cami, the earlier mentioned Sultan Süleyman Cami, and possibly the Koç Cami. But it is not true for the Rizk Cami. Here the minaret instead caught one's eye. Excessively decorated and high rising against the high level of the rock plateau in the background, it even counter balances the prominent cubature of the Small Palace (Fig. 16). The minaret catches the eye of the visitor coming from the north. As an architectural marker it points not only to the mosque but to the palatial structure as well.

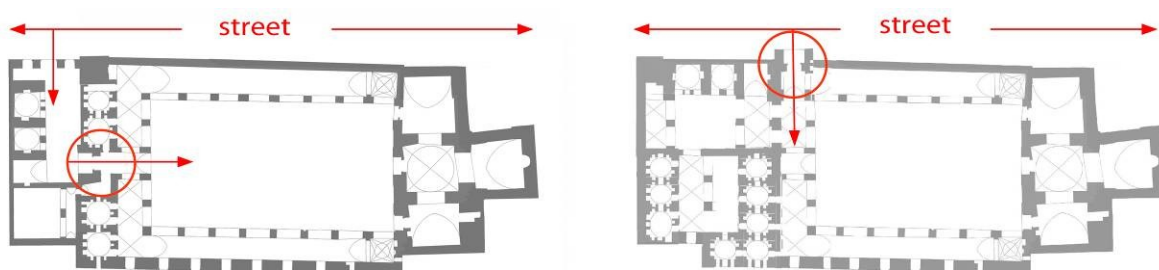


Fig. 17: Arbitrary layout sketch for an alternative arrangement of the building.

<sup>17</sup> References for exemplary evidence, see Meinecke 1992 I, fig. 42, 43, 89, and 97.



If the portal in its actual position had not been important, it would well have been possible to place it along the street facade, arranging the service rooms in another, subordinated way. This might just be demonstrated with an alternative, arbitrary layout sketch (Fig. 17). Thus, the position at the beginning of the main axis respecting the symmetry of the complex and the deviation of the visitor via the forecourt appears as the result of a deliberate choice. In effect the architectural frame of the layout directs the view of the visitor. Still astonished by the overwhelming effect of the exquisite ashlar masonry and rich ornamentation, the view of the visitor, after passing the *real* entrance with the name of the patron inscribed on the lintel, is directed towards the scenery of the palace behind the prayer hall dome (Fig. 18). Even if the visitor came from the south or from the east and entered the building, the palace would have been handed to his eyes on a plate—by the mere arrangement of the main portal. A more economic way of visualizing the local settings of authority my hardly be found.

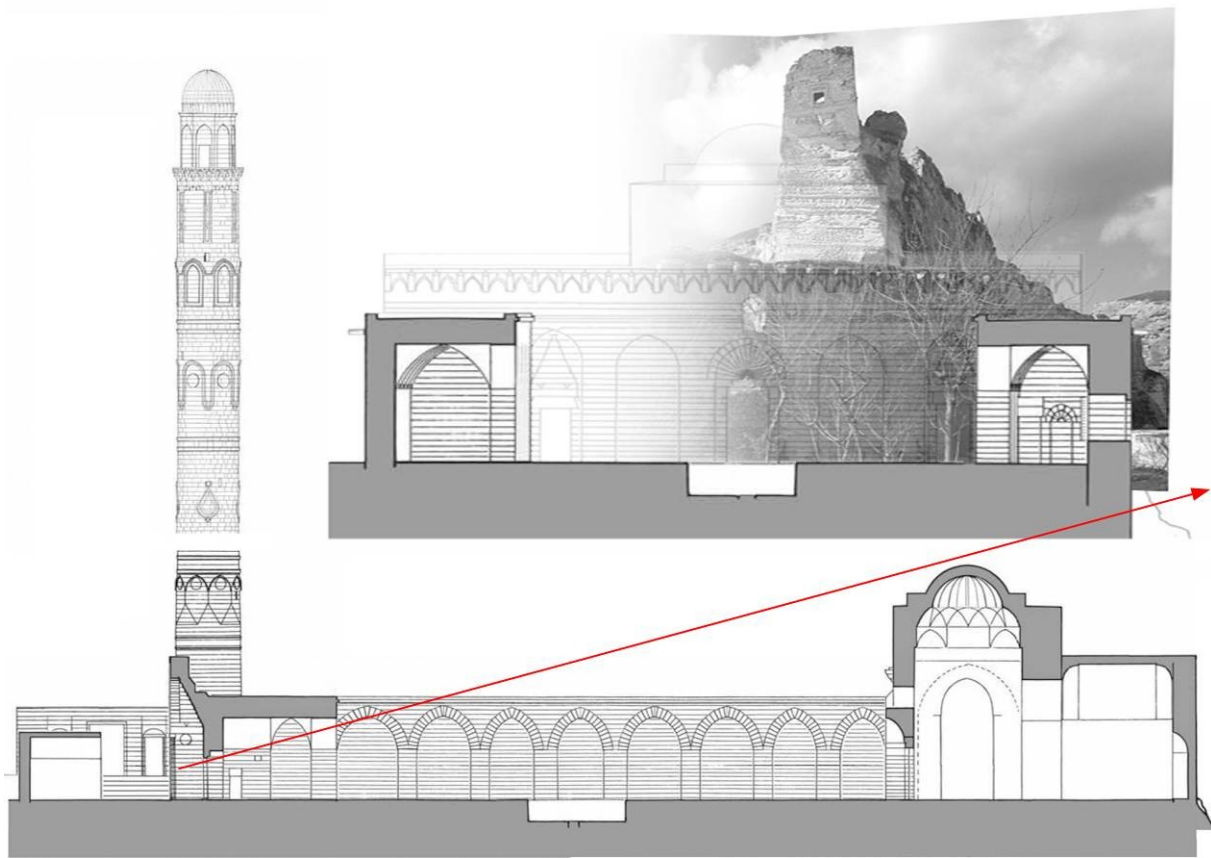


Fig. 18: View from the entrance of the mosque towards the prayer hall (below) and reconstruction of the aspect with the Small Palace in the background of the prayer hall (right).

## Conclusion

It is fascinating to detect how the master masons made up their concepts, from the overall architectonic idea down to the execution of details. The aim of all work obviously was to give the visitor a notion about the authority of the place. Two agents were used for transmitting the message: firstly the visual cohesion of topographically significant elements and secondly the opulence and delicacy of decor and ornament granted to the pious commission by its patron. Visual cohesion was reached by adapting the concept of axiality, a basic but effective concept for that task, to the conditions of the site. Opulence was met by variety and refined execution of all ashlar parts. Thereby the designer found a way to reduce complexity by applying strategies of categorization to the different design tasks, developing typical solutions ready to be copied by artisans less skilled in this respect. This means neither standardization in measures or dimensions nor monotonous repetition. Furthermore, people in charge of the project were well aware of the advantages of the different techniques available and they were ready to apply them when possible within the restraints of the overall concept. Tubular elements as a sort of material less suitable for representation were used for non visible parts of the construction. Plaster decoration was then suitable for the visible parts of non-ashlar construction covering tubular vaultings and rubble masonry. After all, the result of preconception work that made all material fit in the end and the coincidence of both aesthetical and economical concerns relating to each other within the overall design may have pleased not only the patron but also his secretary of treasury. It would be surprising if the Rizk Cami was a singular case in that respect.

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