From Atelier Floor to Monument Wall: How Were Tiles Placed Correctly?

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Medieval and later Islamic Architecture, especially that of Iran, is characterized by the variety of its tilework. Many examples of this, such as tile mosaic, were made on site, but others were manufactured in a workshop that may have been a considerable distance offsite. The most obvious example of this is Kashan tiles, that were, with one exception,[1] manufactured only in the city of that name, but which were made for monuments over a thousand kilometers away.[2] Kashan tiles were relatively easy to assemble, since they tended to be either inscriptions on friezes, mihrabs (also containing inscriptions, and symmetrical elements), or star tiles whose placement was arbitrary.

There is only one part of the Islamic world that seems to have used placement marks to guide the tileworkers, and this only in underglaze-painted tiles. This is Khwarizm, and, in the fourteenth century, the adjacent area under the control of the Golden Horde. Isolated tiles from the Golden Horde territory in Russia, some panels of tiles at the Shrine of Najm al-Din Kubra at Kuhna Urgench[3] and at the Shrine of 'Ala al-Din at Khiva had placing marks from the fourteenth century, and they are ubiquitous on the nineteenth century buildings of Khiva.[4] This paper will both demonstrate these findings and explore the reasons for their rarity. The related topic of seemingly incorrect placement or design in medieval tile panels will then be discussed.

The Shrine of Najm al-Din Kubra (c. 1330)

Ibn Battuta visited Urgench (which he called Khvarizm) in the early fourteenth century during the governorship of the town by Qutlugh Temür (1321-33). He mentions the shrine of Najm al-Din Kubra as being outside the town, and as a place where food was supplied free of charge to travellers.[5] This may have been the same building that survives today and which was, according to the foundation inscription on the *pishtaq*, erected by Qutlugh Temür, the governor of the city for the Golden Horde ruler Özbeg Khan.[6] Much of the original tilework has been lost, but enough survives to get an idea of the range of tilework on the original.

Tilework has survived from two areas of the building, the *pishtaq* (Fig. 1), and the cenotaph in the inner dome chamber. All of the tiles are underglaze-painted, with light- and dark-blue on a white ground, and frequent outlining in black. Both the light- and dark-blue tended to run under the glaze, but this was exploited to maximum effect in the graduated hues used for the chinoiserie blossoms on some panels (Fig. 2).

With inscriptions, which provide an internal order, there is no need for placement marks. Nor would one think that they were necessary for symmetrical panels. The spandrel of the *pishtaq* has a repeating pattern on large hexagonal tiles that do not have any such marks. However, we find them used consistently on the border tiles of the frieze on the soffit of the entrance arch, which also frame a repeating hexagonal pattern (Fig. 3). Unfortunately I did not notice their placement marks when visiting the monument, so I do not have good close up photos of them, but the resolution is nevertheless sufficient to see that on the rectangular border tiles, an alphabetic system consisting sometimes of single (Fig. 4 lower) and also of pairs of letters (Fig. 4 upper) was used.[7] Another similar pair of panels are on the internal sides of the entrance beneath the soffit (Fig. 5). Here I also do not have complete photographic coverage (and the panels on both sides are damaged and far from complete), but some of the rectangular border tiles on the left side have placement marks, including one of a wavy line with a dot beside it (Fig. 6).[8] Since the rectangular border tiles are also symmetrical it is difficult to understand why placement marks were thought necessary, although it is true that the width of the rectangular tiles is not the same as those of the hexagonal tiles of the inner pattern. However, the left panel (Fig. 5) shows the type of mistake that placement marks might have avoided. Two fragments of hexagonal tiles at the top middle each have a right-angled white border that stops suddenly,[9] and the hexagonal tiles at the top left and fight edge don't have a white border where there should be one.

The tympanum over the entrance door is much more complex (Fig. 7). This has a pattern of intricate arabesques in low relief surmounted by an arched Kufic inscription.[10] From afar at first glance this looks like a solid panel; only on closer inspection does it become apparent that it is made up almost completely of hexagonal tiles. There is no connection between the pattern and the size or shape of the tiles. The tiles are centered with the pattern around the vertical axis of symmetry. Only the tiles along the bottom are not hexagonal; they have a base parallel with the lower edge, so that they are pentagonal. There is one white border along the bottom, and two, framing the inscription, around the arched upper section. There are place marks on each, not just alphanumeric, but also consisting of symbols, of which two types seem to have been used.

There are five sequences, one for the bottom border, one each for the two borders of the inscription on the right side of the arch, and similarly one each for the two borders of the inscription on the right side of the arch. The sequence starts at the bottom right, although the craftsmen decided that the half tile at the bottom right would initiate only the sequence of the top right side arch (Fig. 8).

Along the bottom the sequence is alphabetical, reading from right to left. The letter, mostly placed at the right side are *alef*, *be*, *te*, *se* (the top dot of which seems to have been obscured by damage to the tile), *jim*, *chim*, *khe*, *dal* (with a dot below), *zal*, *re* (with a dot below), and *ze*. The leftmost tile, like that on the right, is not marked in this sequence, but is instead in the sequence for the upper left border of the arch.

The right side inner arch has the following sequence[11] going from bottom to top: *alef*, *be*, *te*, *se* and *jim* (on the same tile), *chim*, *khe*, *dal* (with a dot below), *zal*, *re* (with a dot below), *ze*, and finally one whose resolution is not sufficient to make out clearly.[12]

The right side outer arch has the numbers 1, 2, 3, 4 (in the Persian fashion: ۴ rather than the Arab ٤), then a figure that looks like a deformed four, then what may be a five with a tail below the circle, 6, 7 (with a dot to its left), 8, 9, 10[13], 11 with a dot to the right,[14] 12, 13, and 14.

The left side inner arch continues with a different system: two symbols are placed on the edge of the border of each tile next to its match on the adjacent tile. From top to bottom they are two dots, a line with a hook, a cross, a small circle with a hook, a circle, a lower case em, a square, a vee, a triangle and finally, a cross again (Figs. 9-10).

The symbols on the left side outer arch are harder to classify; they are not matched pairs, nor are they ones that I recognize as being part of a sequence, such as *abjad*, or from any other easily recognizable alphabet. One symbol looks like the letter *shin*, another like the number 25, another like the wavy line with a dot that is found on the lower side panel (Figs. 9-10). But the sequence must have been apparent to the makers, so this is a puzzle whose answer awaits.

Fig. 1

Fig. 2

What was the reason for the use of hexagonal tiles on the tympanum? Hexagonal tiles had been used extensively before this in Seljuk Anatolia, principally for dadoes, and also occasionally for domes and cenotaphs.[15] To my knowledge however, this is the first occasion where they are used for a pattern that does not repeat on each hexagonal tile. Here it can at least be said that their shape and size helps to render their joins less visible and so furthers the illusion of an undivided panel. Later examples of their use is this way are extremely rare, the principal examples being *cuerda seca* tile panels on Timur's Aq Saray palace at Shahr-i Sabz (1379-96) (Figs. 11-12) and at the Friday mosque of Samarqand, the Bibi Khanum (1399-1404) (Fig. 13). The Bib Khanum panel is unusual in that the top row is of rectangular tiles and then changes to hexagonal, an indication of its still experimental nature. Timur reportedly deported the craftsmen responsible for the Aq Saray from Khvarizm to Shahr-i Sabz,[16] so perhaps this parallel should not be surprising. In these later examples however, the concealment of the joints was often less successful,[17] no doubt a reason for other or later ateliers' selection of rectangular tiles instead.


Fig. 3


Fig. 4.


Fig. 5


Fig. 6

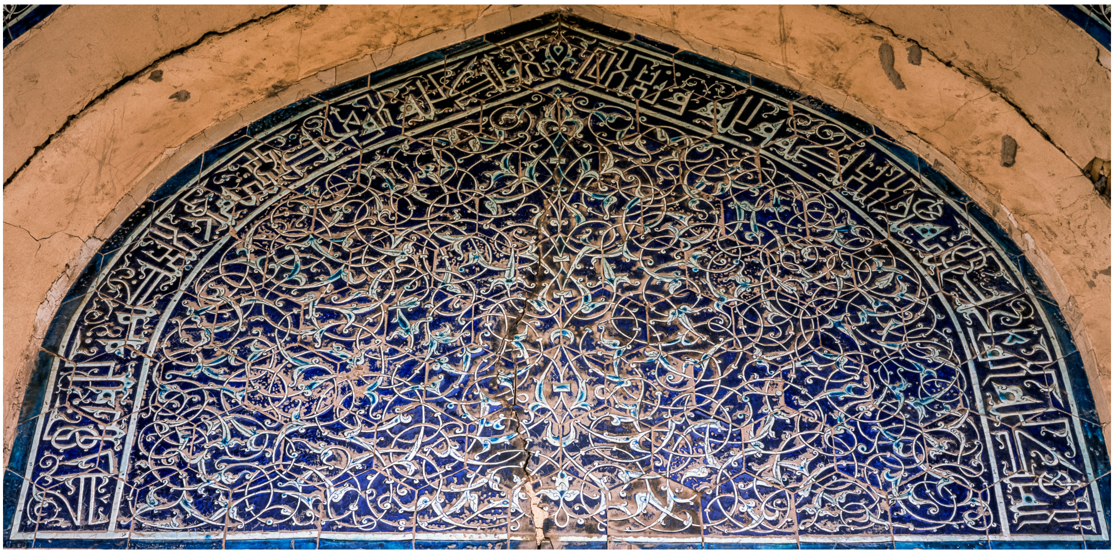
Fig. 7


Fig. 8

Fig. 9

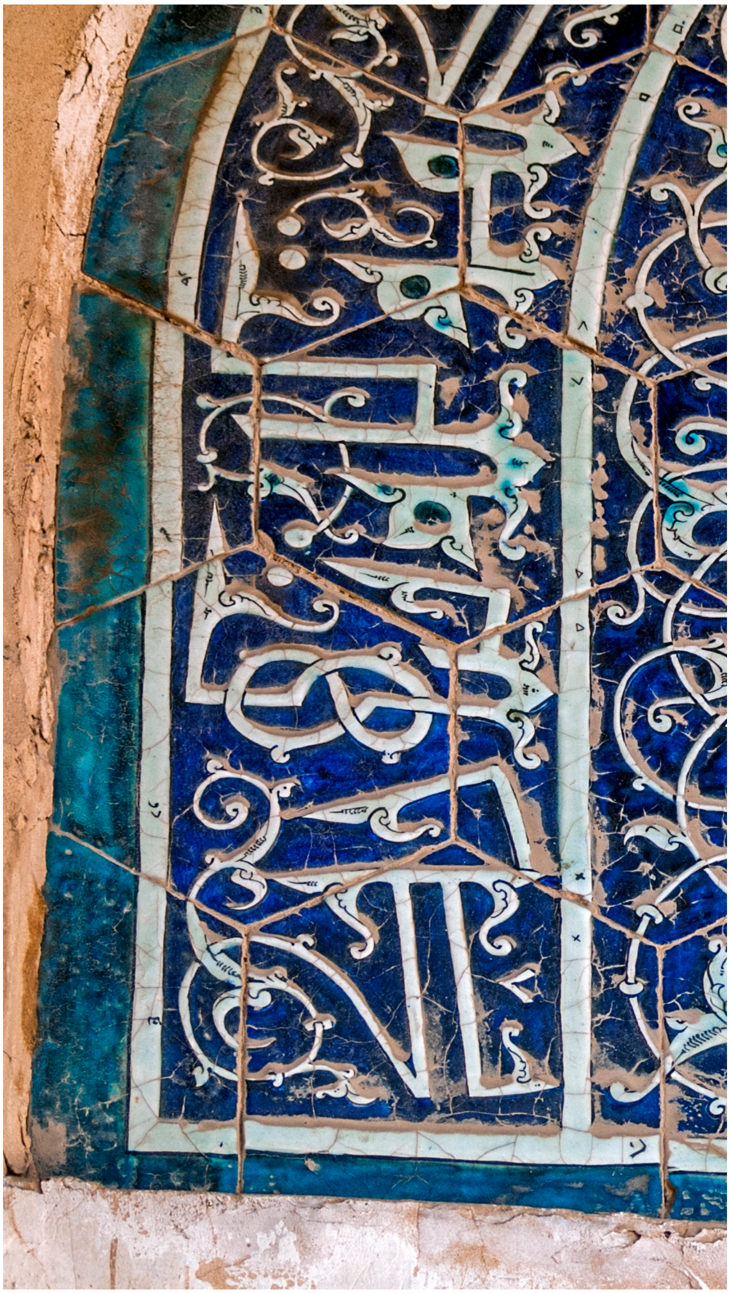

Fig. 10

Fig. 11

Fig. 12

Fig. 13

The Shrine of ‘Ala’ al-Din, Khiva (c. 1340)

Only the tiled cenotaph of this monument dates from the fourteenth century (Fig. 14). It is smaller but very similar in form to that of the Shrine of Najm al-Din Kubra[18] which was badly damaged when the brick dome over the cenotaph collapsed in the mid-twentieth century. Several fragments of the Najm al-Din Kubra cenotaph have survived, but on none of them are any place marks visible.

However, some were certainly used on the ‘Ala al-Din cenotaph. My photographic coverage of these is limited, since a barrier prevented access by visitors to the sides and rear of the cenotaph. Both cenotaphs have or had a rectangular plinth with four panels of polylobed arched on the long sides and two on the shorter sides, and two gabled *tabut*s on top. The chinoiserie-decorated tiles surrounding the polylobed arched panels are either rectangular, **L**-shaped (at the corners) or **T**-shaped (bridging the corners between two polylobed arched panels). There are thus, on the small sides of the cenotaph, four **L**-shaped, two **T**-shaped, and three rectangular panels. There are a total of twelve adjacent placements between all of these tiles. At each of these joins there are matching symbols. For the left polylobed panel they are as follows, going clockwise from the top: a dash, a circle, a line crossed by three smaller ones, two sets of two parallel strokes, two tadpole-like shapes, and three ovals (Fig. 15). The right polylobed panel, going clockwise from the top, has a cross, a vee, a line crossed by two smaller ones, three parallel lines, a line attached to a semi-circle, and two parallel lines.

A further distinction seems to have been made by the potters to eliminate mistakes in assembly. On the short side visible to me the marks are all on the white border. On the long sides of the cenotaph, from the limited viewpoints that I have recorded, all the marks seem to have been on the adjacent turquoise moulding that led to the recessed polylobed arched panels. This permitted, without fear of confusing the two, reuse of symbols found on the white border on the short sides, such as the three parallel lines (Fig. 16).

Fig. 14

Fig. 15

Fig. 16

Golden Horde tiles (14th century)

A few tile fragments have been found at Golden Horde sites, principally Bolgar, which are extremely similar to the previous examples at Kuhna Urgench and Khiva (Fig. 17).[19] The two reproduced here have similar chinoiserie underglaze-painted decoration. One has a *se* on the white border, the other a mixture of symbols which also seems to have been repeated on the outer turquoise border.[20]

There were some kilns in Golden Horde territory,[21] but given the scale and quality of the work at Kuhna Urgench and the prosperity of the city in the fourteenth century[22] it is the most likely candidate for the production center for the underglaze tiles found there and at Khiva and Bolgar. As against this one could argue that they would then have had least need of placement marks, but this is turn can be countered by the evidence from nineteenth century Khiva.

Fig. 17

Nineteenth Century Khiva

Although the apogee of Khiva was in the 17th century, it experienced a revival under its nineteenth century rulers, the Qungrat Khans. They expanded as far south as Marv in modern Turkmenistan, and from there made frequent raids into Qajar-held Khurasan. Their territory contracted after 1873 when the city was occupied by Russian forces and the Khans were compelled to sign an onerous peace treaty.[23]

The extraordinary number of buildings surviving from this period, mostly decorated with underglaze-painted tilework, is witness to the prosperity of the city. As Michael Rogers has noted, the khans revived the cult of Najm al-Din Kubra, as well as building an annex to the shrine of ‘Ala’ al-Din in Khiva, so it should not be surprising that there are stylistic links between the tilework of those earlier monuments.[24] What is more surprising is that virtually all of the tilework carries placement marks.[25]

The most ambitious schemes were to be found in the citadel. There the reception hall (*qurnishkhana*) (1254/1838-9)[26] and the summer mosque (1815-42) have very large expanses of tilework on the flat side walls, with elaborate combinations of arabesque and geometric patterns (Fig. 18). The rectangular tiles are laid out in rows, and each row is numbered from right to left, starting at the bottom right. On the side wall of the reception hall the numbering changes a little more than half way up; the lower row reaches a little above 1092, with a single dot to the left, and the row above starts the number from one again, but this time with two dots to the left of the number (Fig. 19). The numbering system is also a little unconventional:

what at first seems to indicate a five, namely a small circle, is in fact a zero, and a five is consistently written in all the monuments of nineteenth century Khiva as a symbol resembling a polo stick, usually with the hook facing to the bottom left (Fig. 19) but sometimes to the bottom right (Fig. 21).

Although the patterns are symmetrical ones, the places where the tiles were cut does not correspond to any regular division of the pattern. This applies to all of the nineteenth century tilework in Khiva. For instance, take a vertical panel from the exterior of the Muhammad Amin Khan madrasa (1851-5). The horizontal divisions (marked in red on Fig. 20) could easily have been shifted slightly to correspond with the divisions of the pattern, but evidently this was of no concern; it was easier to number the tiles and thus ensure correct placement.

Fig. 18

Fig. 19

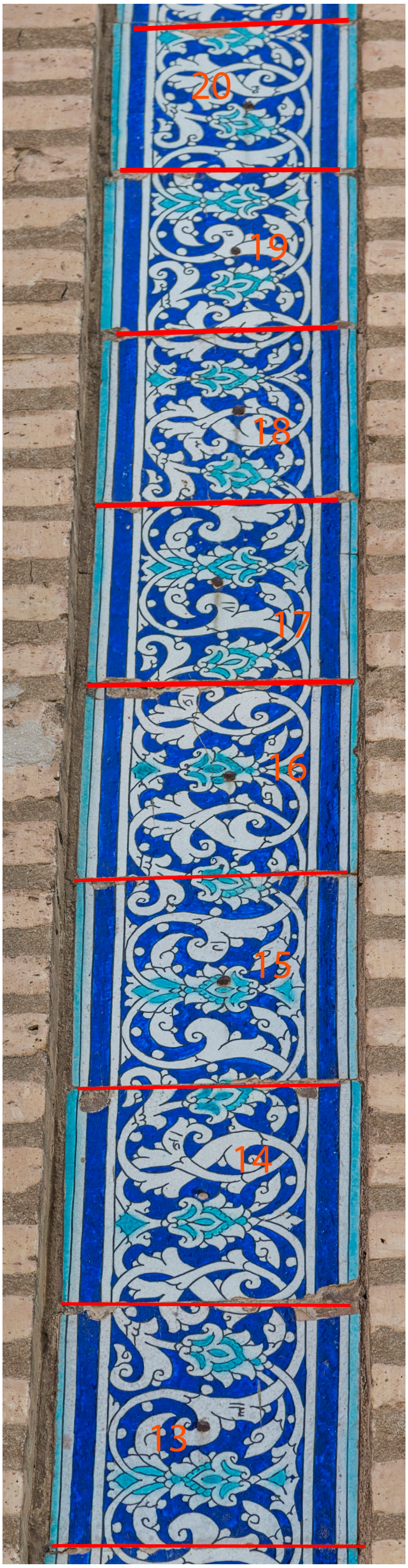

Fig. 20

Fig. 21

With spandrel panels, the rows were drawn across horizontally spanning both sides of the arch, and the numbering again started from the bottom right. On a spandrel from the façade of the Muhammad Rahim Khan madrasa (1871) (Fig. 21) something seems to have gone wrong with the numbering, however. The numbers here have a cross to the right, above or below the numbers. Tile number nine does not have a cross; it is a replacement tile. But the sequence starts unexpectedly after it with 12 on the next tile to the left. Another anomaly is seen on the top row, where two replacement tiles are used from a different numbering system, with the numbers 36 and 37 (without a cross) instead of 40 and 41.

Strangely enough, the numbering was not necessarily a complete safeguard against incorrect placement. On a spandrel from the Allah Quli Khan madrasa (1834-5) (Fig. 22) tile number 42 at the top right has a border much wider than those of the tiles below it. As a result the tiles numbered 42-47 do not match with the pattern in the row below. Only to the left of the tile at the top centre, no. 49, did the pattern of the top rows synchronize again.[27]

A particularly revealing spandrel is found on the exterior of the Muhammad Amin Khan madrasa (1851-5) (Fig. 23). On three tiles no number is visible, probably due to weathering. But it is clear that the numbers in this case were placed upside down, with the numbering beginning at the top right and continuing to the bottom left. In other words, the craftsman numbered the tiles as usual, but the panel was on the ground, life size with the pattern fully drawn, and to him it meant no difference on which side of the arch he stood. It didn't make life any easier for the workers who installed the tiles, which is probably why this method is so rare, but crucially, it tells us that we are dealing with a full scale pattern on a continuous base ready to be cut up into smaller pieces for firing.

Fig. 22

Fig. 23

This method would explain some of the different approaches to cutting up even a pattern that is repeated several times. For instance, at the complex of Mehmed I at Bursa (the Yeşil camı and türbe, 1421), the monochrome-glazed dadoes have *cuerda seca* medallions inserted into them. In each case, although the medallions in the mosque are identical to each other (and those in the mausoleum are also identical to each other), they were cut up into tiles for firing in different ways (Figs. 24-5). Not only that, none of the divisions reflected the symmetrical pattern of the tiles.

When the pattern is already drawn life size, then, while it might be helpful to cut the tiles on the division of the pattern, it is not necessary. Iznik tile panels, for instance, although usually symmetrical around a vertical axis, are not identically drawn and colored on each side. While the cartoon from the drawing workshop may have had one side reversed to make the pattern symmetrical, in practice the potters took a slight amount of leeway, only noticeable on close inspection, in the drawing and colouring of individual elements such as leaves and blossoms. Even in a rigidly symmetrical geometric pattern, such as that on the tympanum to the entrance of the mausoleum of Sultan Selim II at the Hagia Sophia in Istanbul (1577), the tiles were not cut exactly around the symmetry of the vertical axis, but slightly off it to the left (Fig. 26).

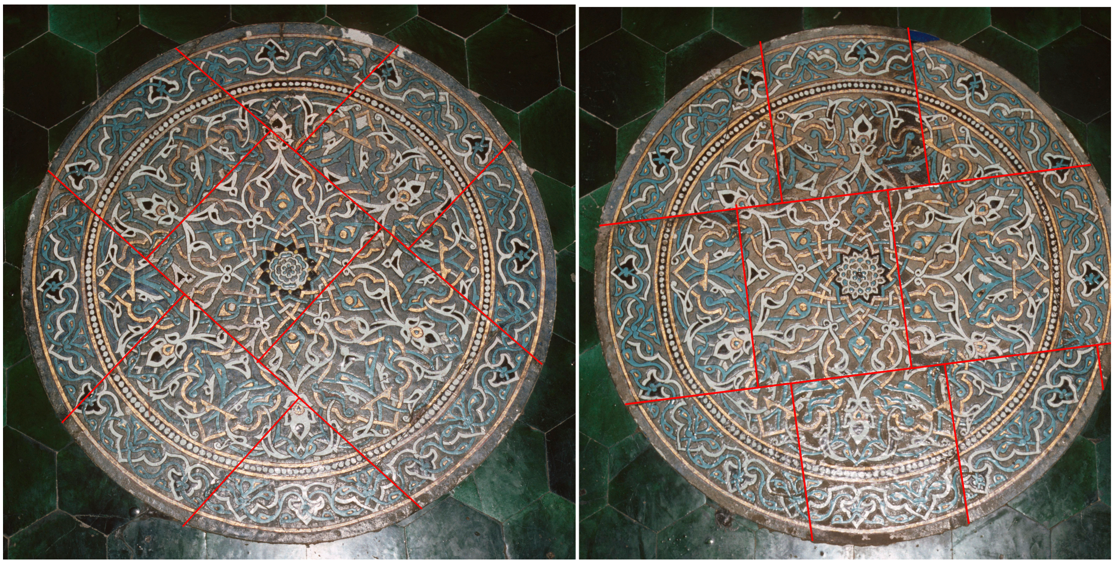

Fig. 24

More puzzling missteps in the transference from drawing to tile sometimes occur. One of the finest pieces of tilework in the Yeşil complex is the *cuerda seca* mihrab of the turbe. On close inspection however, part of its design show a lack of registration (Fig. 27). Similarly, in the *cuerda seca* revetment of the halls adjacent to the qibla dome chamber of the Masjid-i Shah in Isfahan, much of the design around the supposedly symmetrical central axis is badly off registration (Fig. 28). Some of this might be due to restoration (where one would have thought there should also be a concern for following the original design), but certainly not all of it.

Two tympana from the Uç Şerefeli mosque in Edirne (1438-47) display anomalies in their underglaze-painted border tiles (Fig. 29). These, in the courtyard, are the only two original ones left in that area. Each has three tiles in which the border colour is white instead of light-blue. The other elements of the design and colour match exactly, so these are not restorations. It is difficult to think of any good reason why this error arose, or why it should not have been corrected when it was noticed. Perhaps the expense of replacing the tiles was deemed greater than the embarrassment of the mistakes.

Conclusions

Despite the size and complexity of tiles panels used in different parts of the Islamic world, only some of those known from Khvarizm have placement marks. Such marks are likely to have been of most benefit where the atelier was far from the monuments where the tiles were to be used. It is all the more surprising then, that there is no candidate for the place of manufacture of the very extensive tilework on monuments at Khiva in the nineteenth century other than that city itself. Similarly, the most likely place for the manufacture of the other group, that of 14th century Khvarizm, is the most prosperous city in that period, Kuhna Urgench, also the site of the shrine of Najm al-Din Kubra, where its most extensive medieval use has been found.

The numbering of the Khiva tiles clearly reflects a practice whereby a tile panel was first painted full scale on the ground, and then later cut up into smaller tiles, irrespective of any symmetrical pattern it might display. This perhaps reflects the ceramicists' lack of confidence in the ability of the masons or tileworkers to place even a symmetrical revetment on a wall. Potters in other parts of the Islamic world usually did cut up the tiles along the lines of the symmetrical pattern, but the irregular and inconsistent tile divisions found on some other monuments are also best explained by the cutting up of an undivided panel.

Fig. 25

Fig. 26

Fig. 27

Fig. 28

Fig. 29

Bibliography

Fyodorov-Davydov, G.A., tr. H.B. Wells. 1984. *The Culture of the Golden Horde Cities*. British Archaeological Reports International Series, 198. Oxford.

Garriev, A. 1974. *Pamyatniki arkhitekturi Turkmenistana*. Leningrad.

Haddon, Rosalind Wade. 2012. “Unravelling the Enigmatic Fourteenth-Century Mamluk and Mongol Fine Wares: How to Solve the Problem,” in *Islamic Art, Architecture and Material Culture: New Perspectives*, ed. Margaret S. Graves (Oxford), 39-51.

Khalimov, B. 1981. “Nadgrobiye XIV veka iz Kunya-Urgench.” *Sovetskaya Arkheologiya*, 2, 298-9.

Krachkovskaya, V.A. 1946. *Izraztsi mavsoleya Pir-Huseina* (Tblisi).

Kramarovsky, M. 2005. *The Golden Horde: History and Culture* (St. Petersberg).

Kuen, Sara. 2007. “Tilework on 12th to 14th Century Funerary Monuments in Urgench (Gurganj),” *Arts of Asia* 37.2, 112-29.

Mamedov, Mukhammed, and Ruslan Muradov. 2001. *Gurganj: Architectural and Historical Guide* (Padua).

Mankovskaya, L. and V. Bulatov. 1978. *Pamyetniki Zodchestvo Khorezma* (Tashkent).

Mankovskaya, l. 1982. *Khiva. A Museum in the Open* (Tashkent).

Masson, M.E. and G.A. Pugachenkova, tr. J.M. Rogers. 1978 “Shakhri Syabz pri Timuri i Ulug Beke (“Shahr-i SAbz from Timur to Ulugh Beg”)—I,” *Iran* 16.

Masuya, Tomoko. 1997. *The Ilkhanid Phase of Takht-i Sulaiman*. PhD. dissertation, New York University.

Meinecke, Michael. 1976. *Fayencedekorationen seldschukischer Sakralbauten in Kleinasien*. Istanbuler Mitteilungen, 13 (Tübingen).

Noskova, L.M. 1976. “Mozaiki i maioliki iz srednevekovikh gorodov Povolzh’ya,” in *Srednevekoviye Pamyatniki Povol’zh’ya*, ed. A.P. Smirnov and G.A. Fyodorov-Davydov (Moscow), 7-37.

Pilyavsky, V.I. 1974. *Kunya-Urgench* (Leningrad).

Rogers, J.M. 2006. “Nineteenth Century Tilework at Khiva,” in Doris Behrens-Abouseif and Stephen Vernoit (edd.), *Islamic Art in the Nineteenth Century: Tradition, Innovation and Eclecticism* (Leiden and Boston), 363-385.

Sotheby’s. 2004. *Arts of the Islamic World*. 28 April. London.

Voskrensky, A.S. 1967. “Polikhromniye maioliki zolotoordynskogo Povol’zh’ya,” *Sovetskaya Arkheologiya* 2, 79-90.

Yakubovsky, A. 1930. “Gorodische Mizdakhan,” *Zapiski Kollegi Vostokovedov pri Aziastkom Museye Akademii Nauk SSSR* 5, 551-81.

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[1] The Ilkhanid additions to the site of Takht-i Sulayman: Masuya 1997, 226).

[2] For instance, at the Pir Husayn shrine near Baku, for which the most complete publication is Krachkovskaya 1946.

[3] *Kuhna*, from the Persian, meaning old. Unfortunately its transliteration from Persian to Russian and back to English has often resulted in its inaccurate labelling of Kunya Urgench. The town sprang up on near the site of the older Gurganj, sacked by the Mongols. In turn it was sacked by Timur in 1388, but recovered somewhat until the ‘Arabshahid rulers of Khvarizm made Khiva the capital in the 17th century. A new Urgench was then founded near Khiva.

[4] The only reference to these so far is a brief mention of the Khiva and Golden Horde examples in Rogers 2006, 371-2.

[5] Ibn Battuta 1971, 541-2.

[6] For the building see Mamedov and Muradov 2001, 48-55.

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[7] The letters seem to have been written twice, one in smaller form on the thin white border, and again, larger, on the turquoise-coloured border.

[8] Of the photos I have, no placement marks are apparent on the panel on the right side.

[9] It might be thought that this was deliberate, especially if it were symmetrical, but the corresponding panel on the opposite side does not have this feature.

[10] *Al-mulk li'llah al-wahid (al)-ittihad wa ta'ala* (?), Sovereignty belongs to God the One, the Unique, may He be exalted.

[11] The initial *alef* on the bottom border is at the left edge of the tile, this second *alef* on the same tile in on the vertical border.

[12] It might be a *sin* with a dot underneath.

[13] The figure looks like a *mim*, but probably should be interpreted as a one with the dot for the zero carelessly written.

[14] The border is split horizontally among two tiles; the number was written on both.

[15] For examples of dadoes see Konya, Hoca Fakih masjid (c.1222), Meinecke 1976, pl. 24.3; Konya, Bulgur Tekkesi masjid (1240-50), Meinecke 1976, pl. 26.3; Konya, Sahib Ata türbe (1283-92), Meinecke 1976, pl. 39.1 (also for cenotaphs); for a dome: Konya, Shaykh Alman türbe (c. 1288), Meinecke 1976, pl. 40.4.

[16] Masson and Pugachenkova 1978, 118.

[17] Admittedly, in the panel reproduced in Fig. 12, the very noticeable joints are partly the product of modern restoration. Still, for a panel of square Kufic whose design is all of right angles, the choice of hexagonal tiles is surprising to say the least.

[18] Cenotaphs like these seems to have been a specialty of Khvarizm. One other relatively complete example, also of underglaze-painted tiles, is now at the Museum of Islamic Art in Qatar (Sotheby's 2004, lot 94), but the tiles do not have any placement marks. For other cuerda seca cenotaphs at Kuhna Urgench see Khalimov 1982, Kuehn 2007, figs. 9-12 and O'Kane 2009, Fig. 2.19. Michael Rogers also noted the two stepped cenotaphs at the mausoleum of Mazlum Sulu at Mizdakhan (Rogers 2006, 370, n. 16, and Yakubovsky 1930, figs. 9, 12-13).

[19] I am most grateful to Rosalind Haddon for sharing her photos and information on these tiles. Earlier publications include Voskrensky 1967, Fyodorov-Davydov 1984 and Kramarovsky 2005 which have remarked on the placement marks, but without mentioning parallels.

[20] A similar chinoiserie underglaze-painted tile fragment from Bolgar reproduced in Noskova 1976, pl. 6.1, seems to have several placement marks, although the poor quality of the illustration makes this uncertain.

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[21] For a brief survey see Haddon 2012, 41.

[22] Remarked on by Ibn Battuta 1971, 541.

[23] For a fuller account see Rogers 2006, 363-8. For the buildings see Mankovskaya and Bulatov 1978 and Mankovskaya 1982.

[24] Ibid., 369-70.

[25] The first to remark on these, and to connect them with the Bolgar tiles, seems to have been Michael Rogers in ibid., 371.

[26] The date is in figures on the left wall of the hall.

[27] This spandrel also has an irregular sequence at the bottom. It begins with 1 at the bottom right, 2 at the bottom left, a tile with no number at the second right, then 5 at the second left, after which the sequence continues normally.