

# Mail-Order Mihrabs: Collaborative Labor in the Design of Tile Revetments in Iran and the Ottoman Empire

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## Abstract

*When studying tile revetments of monuments in Iran from the late twelfth to the mid-fourteenth century and in the fifteenth-century Ottoman Empire, one is faced with two very different narratives as to how the design and production of these revetments came about. The luster tiles installed in Iran and beyond were produced in one city, Kashan, by well-documented families of tile-makers who left a wide range of signed tiles and vessels. Tiles produced in the Ottoman Empire between the 1410s and the 1470s are attributed to the “Masters of Tabriz,” an elusive group construed to be a multi-generational, itinerant workshop based on a single signature on the mihrab of the mosque-zāviye of the Ottoman sultan Mehmed I (r. 1413–21) in Bursa (1419–21). In a comparative study of these two contexts, this article offers insights into ways of producing and logistics of transporting and installing large-scale tile revetments, and argues that in the Ottoman case, too, production may have taken place at a single site.*

When studying tile revetments of monuments in Iran from the late twelfth to the mid-fourteenth century and in the fifteenth-century Ottoman Empire, one is faced with two very different narratives as to how the design and production of these revetments came about. In the case of Iran, the city of Kashan, an oasis located 240 km south of Tehran to the east of the Dasht-i Kavir desert, was a major center of ceramic production in this period. One of the hallmarks of this production was the luster tiles that were used to clad the dado zones and mihrabs of mausolea, specifically the tomb chambers of (mostly Shi‘i) shrines, although most are no longer in situ.<sup>1</sup> These tiles were used at sites across Iran, including major Shi‘i holy sites such as the shrine of Imām Riżā in Mashhad and smaller *imāmzādas*,

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1. On the Shi‘i context of medieval Kashan, see M. Amanat and R. P. Mottahedeh, “Medieval Kashan: Crossroads of Commerce and Culture,” *Eurasian Studies* 16, no. 1–2 (2018): 395–429, at 400–405. On the prevalence of Shi‘i shrines among sites decorated with luster tiles made in Kashan, see O. Watson, *Persian Lustre Ware* (London: Faber and Faber, 1985), 153–56, where the author notes that the tile makers themselves must have been Shi‘i Muslims. Sheila Blair disagrees with the point that luster tiles were a specifically Shi‘i type of artwork while recognizing the extensive survival of such tiles in Shi‘i shrines: S. S. Blair, “Writing about Faith: Epigraphic Evidence for the Development of Shi‘ism in Iran,” in *People of the Prophet’s House*, ed. F. Suleman, 102–11 (London: Azimuth Editions, 2015), 102–3 and 108–9.

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the Ilkhanid observatory at Maragha, and the Ilkhanid palace of Takht-i Sulayman.<sup>2</sup> The tiles were also exported beyond present-day Iran and have been found in Azerbaijan and Afghanistan.<sup>3</sup> The fact that many tiles were signed and dated has allowed scholars to tie this production securely to Kashan and to understand the timeline of technical and stylistic development.

In the Ottoman Empire, tile revetments composed (in full or partially) of so-called black-line tiles appear in several buildings in Bursa and Edirne, dated between the 1410s and the 1470s.<sup>4</sup> A 1432 mihrab from the Ibrahim Bey Imaret in Karaman (historical Larende), now in the Istanbul Archaeological Museum, also contains such tiles.<sup>5</sup> Since the mihrab of the mosque-zāviye of the Ottoman sultan Mehmed I (r. 1413–21) in Bursa carries the signature “Masters of Tabriz” in Persian on such a tile, the whole corpus of black-line tiles has been attributed to this elusive group, which has been construed as a multi-generational workshop active over more than five decades. Production is generally assumed to have taken place close to the construction site of each building where the tiles were installed. Thus, the “Masters of Tabriz” are believed to have been a traveling workshop, which packed up its supplies and tools as each project ended and moved on to the next one.<sup>6</sup> This narrative of an itinerant workshop persists even though ceramics workshops in Iznik offer an example of the production of both tiles and vessels at one specific site in the Ottoman Empire from the late fourteenth century onward, clearly supported by extensive archaeological evidence.<sup>7</sup>

2. P. Varjavand, *La découverte archéologique du complexe scientifique de l'Observatoire de Marāqé* (Tehran: Amīr Kabīr, 1366/[1987]); T. Masuya, “The Ilkhanid Phase of Takht-i Sulaimān” (PhD diss., New York University, 1997); Y. Porter, “‘Talking’ Tiles from Vanished Ilkhanid Palaces (Late Thirteenth to Early Fourteenth Centuries): Frieze Luster Tiles with Verses from the Shah-nama,” *Journal of Material Cultures in the Muslim World* 2 (2021): 97–149.

3. For the site of Pir Hüseyin (also spelled Pyr-Husain) Khanqah in Qubalı Balaoğlan, Azerbaijan, see V. A. Krachkovskaia, *Izrazt'i Mavzoleia Pir-Khuseina* (Tbilisi: Akademiia Nauk Gruzinskaia SSR, 1946); the website for the shrine (no longer online, last accessed 13 June 2020); and an interview with Anais Leone: C. Rzayeva, “Reimagining Pir Huseyn Khanegah with French Researcher Anais Leone,” *Visions of Azerbaijan*, Autumn 2018. Three tiles from the same inscription frieze are preserved in the State Hermitage Museum in St. Petersburg: *inv. no. A3-20*; *inv. no. A3-21*; and *inv. no. A3-439* (all accessed July 27, 2024).

4. Black-line tiles are sometimes mistakenly designated as *cuerda seca* after the Spanish technique in which cords covered in wax are used to create divisions between pigments: B. O’Kane, “Tiles of Many Hues: The Development of Iranian *Cuerda Seca* Tiles and the Transfer of Tilework Technology,” in *And Diverse Are Their Hues: Color in Islamic Art and Culture*, ed. J. M. Bloom and S. S. Blair, 174–203 (New Haven, CT: Yale University Press, 2011), 182.

5. P. Blessing, “Seljuk Past and Timurid Present: Tile Decoration of the Yeşil Complex in Bursa, Turkey,” *Gesta* 56, no. 2 (2017): 225–50, at 238; M. Meinecke, *Fayencedekorationen seldschukischer Sakralbauten in Kleinasien* (Tübingen: Wasmuth, 1976), 2:172–75.

6. In recent literature, the Masters of Tabriz narrative is upheld in K. Mahi, “Tile Revetments from the 15th Century in Eastern Anatolia: A Problem of Attribution,” in *At the Crossroads of Empires, 14th–15th-Century Eastern Anatolia: Proceedings of the International Symposium held in Istanbul, 4th–6th May 2007*, ed. D. Beyazit, 181–205 (Paris: De Boccard, 2012); K. Mahi, “Les ‘Maîtres de Tabriz,’ céramistes dans l’empire ottoman: Une mise au point sur leur identification,” *Eurasian Studies* 15, no. 1 (2017): 36–79; S. Aube, *La céramique dans l’architecture en Iran au XV<sup>e</sup> siècle: Les arts qarâ quyûnlûs et âq quyûnlûs* (Paris: Presses de l’Université Paris-Sorbonne, 2017), 194–206.

In both cases, the creation and installation of large-scale tile revetments raises questions such as: How were the tiles designed to fit buildings, and how were they transported from Kashan to their destinations? How does the stationary production of Kashan differ from the presumably itinerant one of the Masters of Tabriz? Overall, could an “IKEA model” with shipped pieces and written instructions work, or did an expert need to travel to the site to supervise installation? This article will pursue these questions, attending to design practices, collaborative labor, and the logistics of building sites.



Fig. 1. Tile attributed to the Imāmzāda Yaḥyā, Varamin, ca. 1260 CE. Molded fritware with luster glaze, 30.4 × 30.4 × 1.3 cm. British Museum, London, G.476. Photograph © The Trustees of the British Museum.

7. N. Atasoy and J. Raby, *Iznik: The Pottery of Ottoman Turkey*, 2nd ed. (London: Alexandria Press, 1994), 82–83; O. Aslanapa, “Pottery and Kilns from the Iznik Excavations,” in *Forschungen zur Kunst Asiens in memoriam Kurt Erdmann*, ed. O. Aslanapa and R. Naumann, 140–46 (Istanbul: İstanbul Üniversitesi Edebiyat Fakültesi, Türk ve İslâm Sanatı Kürsüsü, 1969), 142 and fig. 5; V. B. Demirsar Arlı, “Iznik Çini Fırınları Kazısı 2017 Yılı Çalışmaları,” *Kazı Sonuçları Toplantısı* 40, no. 1 (2018): 345–60, at 351–52 and figs. 8–9.

### Kashan as Export Site

Luster tiles (Fig. 1) were prized because the specific technical features of their production led to striking visual effects: the application of metal oxides and sulfites to the glaze adds a metallic sheen following a reduction firing.<sup>8</sup> Kashan has been accepted as the major, and perhaps only, site for the production of luster ceramics in twelfth- to fourteenth-century Iran since Oliver Watson rebutted earlier work that also identified production sites in Rayy, Gurgan, and Sultanabad.<sup>9</sup> In addition to limited evidence of kilns that has been found in Kashan, the fact that the Persian world for tile, *kāshī*, is derived from the city's name serves to make a strong case for the local production.<sup>10</sup> Robert Mason's petrographic analysis of a wide range of luster ceramics from various sites within the Islamic world held in a number of museum collections confirms that a particular type of body composition is tied to Kashan.<sup>11</sup>

Kashan is also unique in the rich array of written sources that point to its role as a place of ceramic production and provide the names of makers. An early fourteenth-century treatise by Jamāl al-Dīn Abū al-Qāsim 'Abd Allāh al-Kāshānī, which describes how to make the fritware produced in Kashan and gives indications as to how glazes were made, provides documentary evidence from the descendant of a family of Kashan ceramic masters, even though it was not written down by someone directly involved in ceramic production.<sup>12</sup> Abū al-Qāsim was part of the scholarly circles that Kashan had been producing for several centuries, and his treatise on ceramics appears in a larger work on the properties of precious stones and minerals that relates to earlier, similar books.<sup>13</sup> Further, as Watson noted, several makers of tiles and ceramic vessels used names that include the *nisba* al-Kāshānī

8. M. S. Graves, "Kashan VII. Kashan Ware," in *Encyclopaedia Iranica*, online ed., 2014.

9. Watson, *Persian Lustre Ware*, 37–44; for archaeological evidence, see *ibid.*, 41, and M. Bahrami, "Contribution à l'étude de la céramique musulmane de l'Iran," *Athār-é Irān* 2 (1938): 225–29.

10. C. Adle, "Kāshī," in *Encyclopaedia of Islam*, 2nd ed., ed. P. J. Bearman et al. (Leiden: Brill, 1954–2009).

11. R. J. T. Mason, *Shine Like the Sun: Lustre-Painted and Associated Pottery from the Medieval Middle East* (Costa Mesa, CA: Mazda, 2004).

12. P. P. Soucek, "Abū'l-Qāsem 'Abdallāh Kāshānī," in *Encyclopaedia Iranica*, 1(4):362–63, 1983, updated 2011. For a critical edition of the Persian text, see Abū al-Qāsim 'Abd Allāh b. 'Alī Kāshānī, *'Arā'is al-jawāhīr wa-nafā'is al-aṭā'ib*, ed. Iraj Afshar (Tehran: Anjuman-i Āsār-i Millī, 1967); for an English translation of the section on ceramics and commentary, see J. Allen, "Abū'l-Qāsim's Treatise on Ceramics," *Iran* 11 (1973): 111–20; and for the Persian text with a German translation, see H. Ritter, J. Ruska, and R. Winderlich, "Eine persische Beschreibung der Fayencetechnik von Kaschan aus dem Jahre 700 h/1301 d.," *Istanbulur Mitteilungen* 3 (1935): 16–56. See also S. R. Canby et al., eds., *Court and Cosmos: The Great Age of the Seljuqs* (New York: Metropolitan Museum of Art, 2016), 187. The parallel Persian and English text of the chapter on ceramics, as well as commentary by Moujan Matin, is available in O. Watson, *Ceramics of Iran: Islamic Pottery from the Sarikhani Collection* (New Haven, CT: Yale University Press, 2020), 459–83.

13. Amanat and Mottahedeh, "Medieval Kashan," 400–406; Ž. Vesel, I. Afshar, and P. Mohebbi, "Le livre des pierres pour Neẓām [al-Molk] (*Javāher-nāme-ye Neẓāmī*) (592/1195–6): La source présumée du *Tansūkh-nāme-ye Īlkhānī* de Ṭūsī," in *Dānishmand-i Ṭūs: 'Ilm va falsafa da 'aṣr-i Khwāja Naṣīr al-Dīn Ṭūsī / Naṣīr al-Dīn Ṭūsī, philosophe et savant du XIII<sup>e</sup> siècle*, ed. N. A. Pourjavady and Ž. Vesel, 145–74 (Tehran: Anjuman-i Īrānshināsī-yi Farānsa dar Īrān, Markaz-i Nashr-i Dānishgāhī, 2000). For analysis of the *Javāhīrnāma-yi Nīẓāmī*'s chapter on ceramics, as well as commentary by Moujan Matin, see Watson, *Ceramics of Iran*, 484–87.

or al-Kāshī, and in the case of a vessel now at the Victoria and Albert Museum, the maker mentions that he lives in Kashan.<sup>14</sup> Dated tiles and vessels reveal that production began in the early thirteenth century, and Abdallah Ghouchani has shown, on the basis of dated tiles at the shrine of Imām Rizā in Mashhad that production continued into the late 1350s, decades beyond what was hitherto thought to be the end date in the 1330s as Ilkhanid rule waned.<sup>15</sup> Since 2015, the project “Medieval Kāshi Online,” directed by Delphine Miroudot, has gathered data on inscribed tiles in museums in Iran, Europe, and North America. The material has begun to be made available in a searchable database of tiles, with images and readings of the inscriptions included, providing access to information about places of production and makers’ names as well as dates for currently more than 500 tiles in European and North American museums.<sup>16</sup>

Although most known sites where Kashan tiles were installed are located within present-day Iran, they were also exported widely, as archaeological evidence shows. Lusterware attributed to Kashan, including a few tile fragments, have also been found in archaeological contexts in Jam (Afghanistan) and in Qalhat (Oman).<sup>17</sup> Yves Porter has gathered extensive evidence of the use of tiles with inscriptions that contain passages from the *Shāhnāma* at Ilkhanid palace sites and, in probably secondary use, in churches in present-day Armenia.<sup>18</sup> Further, Richard McClary argues that *mīnā’ī* (also known as *haft rang*) tiles found in the kiosk of Qilij Arslān II in Konya, Turkey, a late twelfth-century Saljuq pavilion, must have come from Kashan, the only known site of production for such tiles.<sup>19</sup> Thus, exports from Iran to Anatolia are possible in the case of luster tiles, although the evidence is less straightforward since luster ceramics were also produced in Syria during the same period.<sup>20</sup> Lusters tiles are rare in Anatolia, and for those found at the early thirteenth-

14. *Al-muqīm bi-Kāshān*; Watson, *Persian Lustre Ware*, 41 and plate G; Victoria and Albert Museum, London, inv. no. C.162-1977 (accessed November 15, 2020).

15. A. Ghouchani, *Aḥādīth-i kāshihā-yi zarrīn-fām-i ḥaram-i muṭahhar-i Imām Rizā = The Golden Tiles Tradition of Imam Reza’s (A.S.) Holy Shrine* (Mashhad: Bunyād-i Pizhūhishhā-yi Islāmī, 1397 sh./[2018-19]), 76.

16. See [Medieval Kāshi online database](#), accessed January 19, 2024.

17. A. L. Gascoigne and R. Bridgman, “Pottery from Jām: A Mediaeval Ceramic Corpus from Afghanistan,” *Iran* 48 (2010): 107-51; A. Rougeulle, Th. Creissen, and V. Bernard, “The Great Mosque of Qalhāt Rediscovered: Main Results of the 2008-2010 Excavations at Qalhāt, Oman,” in “Papers from the Forty-Fifth Meeting of the Seminar for Arabian Studies Held at the British Museum, London, 28 to 30 July 2011,” *Proceedings of the Seminar for Arabian Studies* 42 (2012): 341-56.

18. Porter, “‘Talking’ Tiles.” On *Shāhnāma* tiles, see also A. Ghouchani, *Ash ‘ār-i fārsī-yi kāshihā-yi Takht-i Sulaymān* (Tehran: Markaz-i Nashr-i Dānishgāhī, 1992), and A. S. Melikian-Chirvani, *Les frises du Shāh Nāme dans l’architecture iranienne sous les Ilkhān* (Paris: Association pour l’avancement des études iraniennes, 1996).

19. R. P. McClary, *Rum Seljuq Architecture, 1170-1220: The Patronage of Sultans* (Edinburgh: Edinburgh University Press, 2017), 30-31; more broadly on *mīnā’ī* ceramics, see R. P. McClary, “Calouste Gulbekian, His *Mīnā’ī* Ware and the Changing Islamic Art Market in the Early Twentieth Century,” *Muqarnas* 37 (2020): 325-44, and R. P. McClary, *Mīnā’ī Ware: A Reassessment and Comprehensive Study of Iranian Polychrome Overglaze Wares through Sherds* (Edinburgh: Edinburgh University Press, 2024). Further evidence for the export of *mīnā’ī* tiles is a tile found at Kone Urgench, Turkmenistan: Canby et al., *Court and Cosmos*, 80, cat. 19.

20. S. Redford and J. M. Blackman, “Luster and Fritware Production and Distribution in Medieval Syria,” *Journal of Field Archaeology* 24, no. 2 (1997): 233-47, at 233-35.

century Saljuq palace of Kubadabad, publications of the material found at the site generally imply that these and other ceramic revetments found on site were produced locally.<sup>21</sup> The evidence for such production is, however, limited to a single kiln.<sup>22</sup> Considering the large numbers of tiles—both luster and underglaze painted ones—found at Kubadabad, we must seriously consider the possibility that tiles were imported from various production sites, including ones in Iran and northern Syria.

### Tile Revetments from Kashan

Unlike the Ottoman examples, few tile revetments produced in Kashan remain in situ because large numbers of tiles were removed in the nineteenth century and sold off piecemeal, catering to the newly emerging European market for Islamic art.<sup>23</sup> In his monograph on Persian luster ceramics, Watson listed twenty-four sites for which luster tiles are documented; of these, six still had tiles in situ in the 1970s.<sup>24</sup> Today, a rare revetment that remains in situ is at the shrine of Fāṭima Maʿšūma in Qum, Iran.<sup>25</sup> At the shrine of Imām Rizā in Mashhad, parts of the tile revetment remain in place, but the two of the three tiled mihrabs were moved to the site's museum in 1978, after Watson conducted his research.<sup>26</sup> In Ghouchani's detailed study of tiles at the site, which includes the inscriptions that are found on many of the hexagonal, octagonal, and star-shaped tiles, the most recent examples are

21. R. Arık, *Kubad Abad: Selçuklu Saray ve Çinileri* (Istanbul: Türkiye İş Bankası, 2000), 165–67; R. Arık, “Kubad Abad Çinileri,” in *Beyşehir Gölünün Kıyısında Bir Selçuklu Sitesi: Kubad Abad*, ed. A. Yavaş and O. Koçyiğit, 225–76 (Konya: Konya Büyükşehir Belediyesi, 2018); on ceramic vessels from the site, see M. Çeken, “Kubad Abad Sarayı Selçuklu Dönemi Seramik Buluntuları,” in Yavaş and Koçyiğit, *Beyşehir Gölünün Kıyısında Bir Selçuklu Sitesi*, 283–334, with discussion and local attribution of luster ceramics at 285–96. Similar claims of local luster production with scarce evidence have also been made for Ahlat: see B. Karamağaralı, “Ahlat'ta Bulunan Bir Çini Fırını,” *Ankara Üniversitesi İlahiyat Fakültesi Türk ve İslam Sanatları Enstitüsü Yıllık Araştırmalar Dergisi* 3 (1981): 67–93; B. Karamağaralı, “Ahlat Seramik Ekolü,” *Ankara Üniversitesi İslami İlimler Dergisi* 5 (1982): 391–462, at 398. For an overview of more recent work at Ahlat without specific information on ceramic production, see C. Arslan, “Ahlat Kazılarının Dünü—Bugünü,” in “21. Uluslararası Ortaçağ ve Türk Dönemi Kazıları ve Sanat Tarihi Araştırmaları Sempozyumu Bildirileri,” special issue, *Akdeniz Sanat Dergisi* 13 (2019): 199–214.

22. A. O. Uysal, “Kubad Abad Saray Külliyesinin Mimarisi,” in Yavaş and Koçyiğit, *Beyşehir Gölünün Kıyısında Bir Selçuklu Sitesi*, 111–54, at 125, fig. 24.

23. T. Masuya, “Persian Tiles on European Walls: Collecting Ilkhanid Tiles in Nineteenth Century Europe,” *Ars Orientalis* 30 (2000): 39–54; S. S. Blair, “Art as Text: The Luster Mihrab in the Doris Duke Foundation for Islamic Art,” in *No Tapping around Philology: A Festschrift in Honor of Wheeler McIntosh Thackston Jr's 70th Birthday*, ed. A. Korangy and D. J. Sheffield, 407–36 (Wiesbaden: Harrassowitz, 2014); M. Ritter, “The Kashan Mihrab in Berlin: A Historiography of Persian Lusterware,” in *Persian Art: Image-Making in Eurasia*, ed. Y. Kadoi, 158–78 (Edinburgh: Edinburgh University Press, 2018); and K. Overton, “Jane Dieulafooy in Varamin: The Emamzadeh Yahya through a Nineteenth-Century Lens,” *Getty Research Journal* 19 (2024).

24. Watson, *Persian Lustre Ware*, 183–88.

25. Masuya, “Persian Tiles on European Walls,” 46; H. Modarressi Tabatabaʿi, *Turbat-i Pākān: Āsār va bināhā-yi qadīm-i maḥdūda-yi kunūnī-yi Dār al-Muʿminīn-i Qum* (Qum: Mihr, 2535 Shahanshahi/1976 CE), vol. 1, figs. 2–10.

26. For an image of the mihrab dated Rabiʿ II 612/August 1215 in situ, see Blair, “Art as Text,” 427, fig. 5. Watson, *Persian Lustre Ware*, 185 lists the mihrabs in situ since they had not yet been moved to the shrine museum when he conducted his research in the 1970s. On the mihrabs, see also H. Kafili, “Mihrābhā-yi zarrīn-fām-i ḥaram-i muṭahhar dar mūza-yi markazī-yi Āstān-i Quds-i Rizāvī,” *Shamsa* 5, no. 18 (Spring 1392 sh. [2013]).

dated AH 759 (1359 CE) and AH 760 (1360 CE).<sup>27</sup> Tiles have also been documented in situ into the twentieth century at the Masjid-i ‘Alī in Quhrud, Iran, as well as at the shrine of Imām ‘Alī in Najaf, Iraq.<sup>28</sup> Many more luster tiles are today dispersed in museums in Europe, the United States, and Iran. For objects preserved in collections outside Iran, provenance from a specific building is hardly ever securely given, while tiles in Iranian museums were often specifically removed to prevent theft.

Tiles in museum collections range from single tiles to complete mihrabs. Perhaps the best-known fully preserved mihrab, as Markus Ritter notes, is that from the Masjid-i Maydān in Kashan, which entered the collection of the Museum für Islamische Kunst in Berlin in 1927 (Fig. 2).<sup>29</sup> It is shown in situ in an engraving that the French archaeologist Jane Dieulafoy published in her account of travels in Iran in 1881 and was removed sometime between then and the German art historian Friedrich Sarre’s visit to the site in 1900.<sup>30</sup> Watson and Sheila Blair note that since the Masjid-i Maydān dates to the fifteenth century whereas the mihrab is dated Safar 623 (February 21–March 1, 1226), the site from which it was removed in the nineteenth century could not have been its original location.<sup>31</sup> Such reuse was not uncommon: Tomoko Masuya argues for the reuse of tiles from the Ilkhanid palace of Takht-i Sulayman, built in the 1270s, at a number of religious sites in the second half of the fourteenth century after the palace fell into disuse with the end of Ilkhanid rule.<sup>32</sup> Therefore, this mihrab constitutes a case of historical reuse in the fifteenth century or later, and it highlights the fact that tiles were inherently movable objects, even though the twenty-first century mind tends to think of them as fixed once installed.<sup>33</sup>

27. Ghouchani, *Aḥādīth-i kāshihā-yi zarrīn-fām*, 76.

28. O. Watson, “The Masjid-i ‘Alī, Quhrūd: An Architectural and Epigraphic Survey,” *Iran* 13 (1975): 59–74; M. Aga-Oglu, “Fragments of a Thirteenth-Century Mihrāb at Nedjef,” *Ars Islamica* 2, no. 1 (1935): 128–31.

29. On the move to Berlin, see Ritter, “Kashan Mihrab in Berlin,” 164–65; Museum für Islamische Kunst, Staatliche Museen zu Berlin, *inv. no. I. 5366* (accessed July 28, 2024).

30. J. Dieulafoy, *La Perse, la Chaldée et la Susiane: Relation de voyage* (Paris: Hachette, 1887), 204–6; Ritter, “Kashan Mihrab in Berlin,” 158–59; Blair, “Art as Text,” 410–11; Masuya, “Persian Tiles on European Walls,” 51. Dieulafoy’s account also allows us to narrow down the timeframe of the mihrab’s removal, since Friedrich Sarre mentions that it was no longer in situ during his visit in 1900: F. Sarre, *Denkmäler persischer Baukunst* (Berlin: Wasmuth, 1910), 72. Sarre was by no means innocent when it comes to trade in plundered tile revetments, as a number of Kashan tiles, some attributed to specific sites in Iran and others without provenance, were part of his collection of Islamic art: Sarre, *Denkmäler persischer Baukunst*, figs. 76, 77, 78, 79, 80, 81, 83. On Sarre as a traveler and collector, see O. Pancaroğlu, “A Fin-de-Siècle Reconnaissance of Seljuk Architecture in Anatolia: Friedrich Sarre and His *Reise in Kleinasien*,” in *Scramble for the Past: A Story of Archaeology in the Ottoman Empire, 1753–1914*, ed. Z. Bahrani, Z. Çelik, and E. Eldem, 399–416 (Istanbul: SALT, 2011). On Dieulafoy, see E. Gran-Aymerich, “Jane Dieulafoy (1851–1916),” in *Breaking Ground: Pioneering Women Archaeologists*, ed. G. M. Cohen and M. Sharp Joukowsky, 34–67 (Ann Arbor: University of Michigan Press, 2014).

31. Blair, “Art as Text,” 410.

32. Masuya, “Persian Tiles on European Walls,” 49; on the German excavations at Takht-i Sulayman, see R. Naumann, *Die Ruinen von Tacht-e Suleiman und Zendan-e Suleiman und Umgebung* (Berlin: Reimer, 1977), 72–103.

33. E. Hoffman, “Pathways of Portability: Islamic and Christian Interchange from the Tenth to the Twelfth Century,” *Art History* 24, no. 1 (2001): 17–50; A. Shalem, “The Poetics of Portability,” in *Histories of Ornament*, ed. Alina Payne and Gülru Necipoğlu, 250–61 (Princeton, NJ: Princeton University Press, 2016).



Fig. 2. Mihrab from the Masjid-i Maydān, Kashan, signed by Ḥasan b. ʿArabshāh, dated Safar 623 (February 21–March 1, 1226). Molded fritware with luster glaze, 280 × 180 cm. Museum für Islamische Kunst, Berlin, I5366. Photograph: Staatliche Museen zu Berlin, Museum für Islamische Kunst / Johannes Kramer, CC BY-SA 4.0.



Fig. 3. Imāmzāda ‘Alī b. Ja‘far, Qum, AH 700–40 (1301–39 CE). Photograph by Antoin Sevruguin, ca. 1880–89 / National Museum of Asian Art Archives, Smithsonian Institution, Myron Bement Smith Collection, FSA\_A.4\_2.12.Sm.60.



Fig. 4. Mihrab of Imāmzāda ‘Alī b. Ja‘far, Qum, dated 1 Ramadan 734 (May 5, 1334) and signed Yūsuf b. ‘Alī on the tile marked with a large rectangle. The small rectangle marks a tile dated AH 713 (1313 CE). Molded fritware with luster glaze, 328 × 212 cm. Islamic Museum, National Museum of Iran, Tehran, inv. no. 32790. Photograph by the author, 2019.

Fig. 5 & 6.  
Detail of mihrab of  
Imāmzāda ‘Alī b. Ja‘far, Qum, dated 1  
Ramadan 734 (May 5, 1334). Molded  
fritware with luster glaze, 328 × 212 cm.  
Islamic Museum, National Museum of  
Iran, Tehran, inv. no. 32790.  
Photograph by the author, 2019.



A further mihrab came from the Imāmzāda of ‘Alī b. Ja‘far (Fig. 3) in Qum, a monument built in several phases between 1301 and 1339 and typical of the many mausolea built for highly venerated descendants of the twelve Shi‘i imams across Iran.<sup>34</sup> The mihrab (Fig. 4) is now preserved in the Islamic Museum in Tehran, part of the National Museum of Iran, where it has been since the 1930s, when it was removed from the shrine to protect it from the fate of the many other tiles that were stolen in the nineteenth and early twentieth centuries.<sup>35</sup> Like all large-scale mihrabs from Kashan, this example consists of a large rectangle structured with a monumental outer inscription frieze that runs along three sides, from the lower right to the lower left corner. Within this frame, a larger and a smaller niche are nestled within each other, framed in each case by an inscription shaping the top of the niche and columns and capitals in high relief forming the sides (Figs. 5 and 6). Two tiles attributed to the mihrab and belonging to the outer inscription frieze are now at the Metropolitan Museum of Art in New York (Fig. 7).<sup>36</sup> A lateral view clearly shows how thick such frieze tiles were; this tile measures 6.7 cm at its thickest (Fig. 8).<sup>37</sup>

Fig. 7.

Frontal view of a tile from the large Qur’anic inscription frieze of the mihrab of Imāmzāda ‘Alī b. Ja‘far, Qum, dated 1 Ramadan 734 (May 5, 1334).  
Molded fritware with luster glaze,  
17 5/8 in. (44.8 cm) × 15 1/2 in. (39.4 cm)  
× 2 5/8 in. (6.7 cm).  
Metropolitan Museum of Art, New York,  
H. O. Havemeyer Collection,  
Gift of Horace Havemeyer, 1940, inv. no. 40.181.6.  
Photograph provided by the Metropolitan Museum of Art’s Open Access program.



34. D. N. Wilber, *The Architecture of Islamic Iran: The Il Khānid Period* (Princeton, NJ: Princeton University Press, 1955), 132–33.

35. Masuya, “Persian Tiles on European Walls,” 46. Wall tiles from the site were moved to the shrine museum in Qum in 1917: D. Miroudot, “Les carreaux iraniens à décor de lustre métallique des XIII<sup>e</sup> et XIV<sup>e</sup> siècles: Medieval Kāshi Project,” in “La recherche au Musée du Louvre,” special issue, *La Grande Galerie: Le journal du Louvre*, May 2017, 48.

36. Metropolitan Museum of Art, New York, inv. nos. 40.181.5 and 40.181.6 (both accessed October 3, 2020). The inscription on 40.181.6 is Qur’an 7:54, *wa-l-arḍ fī sittat a[yyām]*. On inv. no. 40.181.5, the inscription is *al-raḥmān al-raḥīm*, suggesting that this was the second tile in the inscription, which started with the *basmala* in the lower right corner. Both tiles entered the Metropolitan Museum of Art’s collection in the 1940s from the Havemeyer Collection. In the object records, both tiles are identified as having come from the Imāmzāda ‘Alī b. Ja‘far but are not placed in the context of the mihrab.

37. Metropolitan Museum of Art, New York, inv. no. 40.181.6. The tiles are identified as belonging to the mihrab in Masuya, “Persian Tiles on European Walls,” 46.



Fig. 8. Lateral view of a tile from the large Qur'anic inscription frieze of the mihrab of Imāmzāda 'Alī b. Ja'far, Qum, dated 1 Ramadan 734 (May 5, 1334).

Molded fritware with luster glaze,  $17\frac{5}{8}$  in. (44.8 cm)  $\times$   $15\frac{1}{2}$  in. (39.4 cm)  $\times$   $2\frac{5}{8}$  in. (6.7 cm).

Metropolitan Museum of Art, New York, H. O. Havemeyer Collection, Gift of Horace Havemeyer, 1940, inv. no. 40.181.6. Photograph provided by the Metropolitan Museum of Art's Open Access program.

Approximate modern copies of both tiles are now installed in the display of the mihrab at the National Museum of Iran in Tehran. In a photograph of the mihrab in Yedda Godard's 1937 publication on dated luster ceramics from Kashan, these two tiles are missing along with several others from the same frieze.<sup>38</sup> This mihrab is dated 1 Ramadan 734 (May 5, 1334) and signed Yūsuf b. 'Alī.<sup>39</sup> However, as Godard notes, one tile on the mihrab carries another date, AH 713 (1313 CE), and she argues that tiles with commonly used texts such as Qur'an passages that frequently appeared in architectural contexts may have been kept in stock.<sup>40</sup> This argument raises questions regarding supply and demand: Were tiles kept in stock in case high demand arose suddenly, or in case a commission with a short turnaround time came up? Was the tile kept in storage for nearly thirty years because the expected commissions did not come in, or was it retained from a project that fell through? These questions remain open for now, but I will return to them when discussing questions related to design. Beyond the mihrabs and inscribed border tiles highlighted above, it is useful to grasp the extent of the tile revetments in terms of the wall surface covered and the number of individual tiles to understand how complex the design processes had to be.<sup>41</sup>

Assessing how the tiles would have been transported from Kashan to their destinations first requires an understanding of the scale and weight of these tile programs. Although weight data is often not given in museum records for tiles, available numbers for some examples in the Metropolitan Museum of Art allow for approximate calculations of how much a full tile revetment could have weighed before its installation. An early fourteenth-

38. Y. Godard, "Pièces datées de céramique de Kāshān à décor lustré," *Athār-é Īrān* 2 (1937): 309–37, at 314, fig. 139; the image shows that the mihrab has been heavily restored.

39. Blair, "Art as Text," 409. The signature is highlighted with the larger orange rectangle in Fig. 4.

40. Y. Godard, "Pièces datées," 317; this possibility is also raised in S. S. Blair, *The Ilkhanid Shrine Complex at Natanz, Iran* (Cambridge, MA: Center for Middle Eastern Studies, Harvard University, 1986), 40. The date is highlighted with the smaller orange rectangle in Fig. 4.

41. For a case study, see A. Leone, "New Data on the Luster Tiles of 'Abd al-Samad's Shrine in Natanz, Iran," *Muqarnas* 38 (2021): 331–56.

century corner tile weighs 5.4 kg.<sup>42</sup> A panel of nine cross-shaped and four star-shaped tiles weighs 14.1 kg; the height of each individual tile is about 20.3 cm, and the weight per tile about 1.08kg.<sup>43</sup> This is the standard size for tiles in the post-Mongol period; previously, they had been closer to 30 cm—a size that in later examples appears only in the cross- and star-shaped tiles from the Imāmzāda Yaḥyā in Varamin (Fig. 9).<sup>44</sup> Another panel composed of twenty-seven tiles weighs a total of 23.1 kg, or about 0.855 kg per tile, although it is not clear whether the weight indicated in the collection database includes plaster backing or mounting.<sup>45</sup> Writing about the mihrab from the Masjid-i Maydān in Kashan (see Fig. 2), Ritter noted that when the mihrab was shipped from London to Berlin in 1927, the weight was given as 2,568.5 kg, although this likely included the plaster mounting and possibly shipping crates.<sup>46</sup>



Fig. 9.  
Imāmzāda Yaḥyā, Varamin,  
AH 660–62 (1261–63 CE) and  
AH 705–7 (1305–7 CE).  
Photograph: Pouyakhani / Wikimedia  
Commons / CC BY-SA 4.0.

42. Metropolitan Museum of Art, New York, *inv. no.* 40.181.8 (accessed March 27, 2024). Further data for this and the other objects discussed below is not available: email communication from Martina Rugiadi, associate curator for Islamic art, Metropolitan Museum of Art, July 31, 2020.

43. Metropolitan Museum of Art, New York, *inv. no.* 41.165.37 (accessed June 24, 2020).

44. I am grateful to the late Oliver Watson for pointing this out to me. For pre-Mongol dated tiles, see *inv. no.* 11.40, dated 1208 CE, and *inv. no.* 07.670, dated AH 606 (1210 CE), at the Museum of Fine Arts, Boston (both accessed November 19, 2020).

45. Metropolitan Museum of Art, New York, *inv. no.* 41.165.22 (accessed May 20, 2023). The panel measures 71.1 × 101.6 cm, and each individual tile measures 20.3 × 20.3 cm along the longest horizontal and vertical axes; this is true for both cross- and star-shaped tiles. The thickness is given as 3.8 cm, but this may include mounting since the cross- and star-shaped tiles are typically about 1.1 to 1.4 cm thick.

46. Ritter, “Kashan Mihrab in Berlin,” 166–67. The mihrab, *inv. no.* I.5366, measures 280 × 180 cm. The object record does not indicate the mihrab’s weight. Further data is not available in the museum’s internal records: email communication from Deniz Erduman-Çalış, curator, Museum für Islamische Kunst, July 2, 2020. By comparison, the thirteenth-century tile mosaic mihrab from the Bey Hekim Mosque in Konya in the same collection, *inv. no.* I.7193, measures 395 × 280 cm and weighs 1,107.11 kg without the steel mounting.

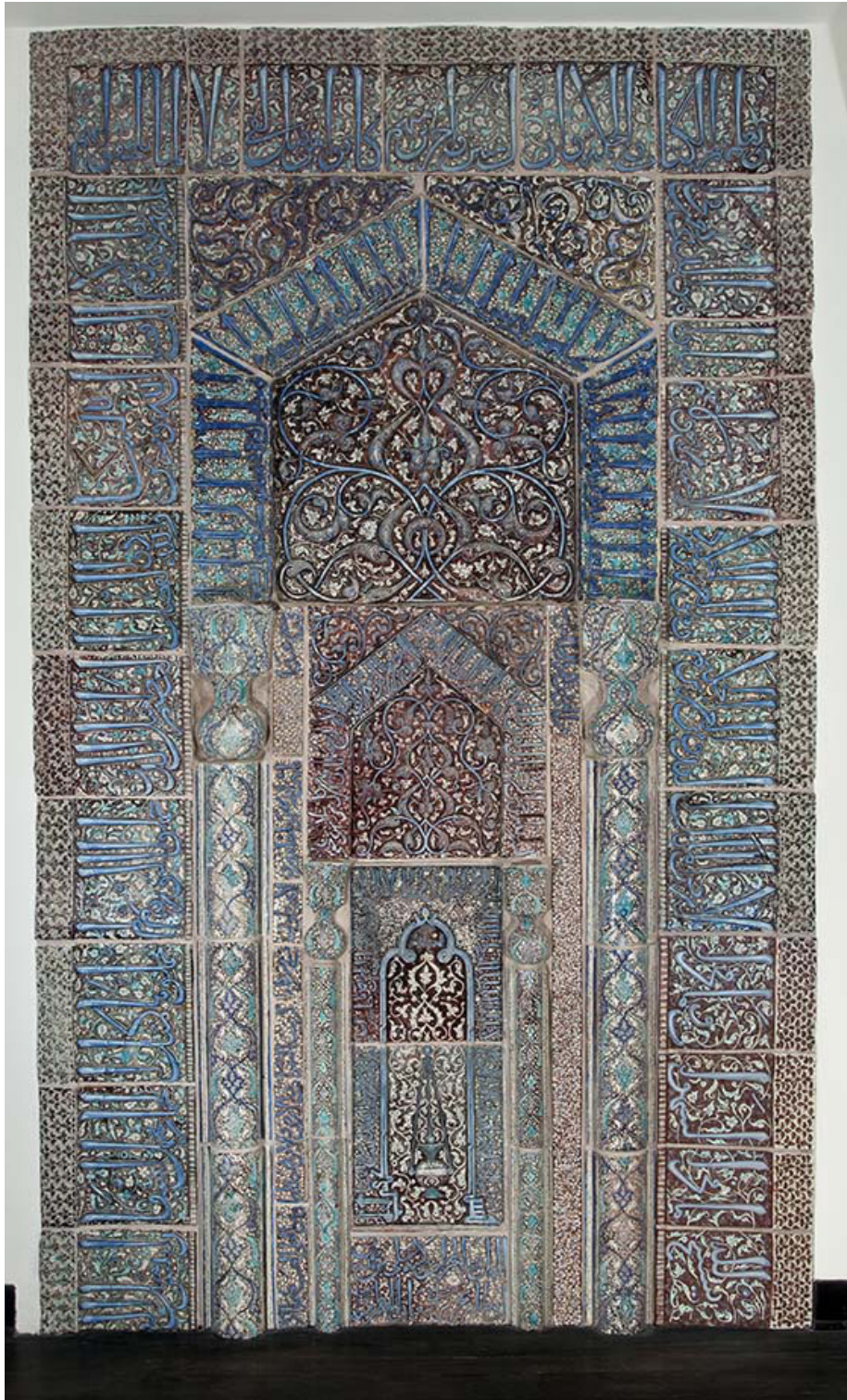


Fig. 10. Mihrab from the Imāmzāda Yahyā, Varamin, dated Shaʿban 663 (May 1265). Molded fritware with luster glaze, 385 × 229 cm. Doris Duke Foundation for Islamic Art, Honolulu, inv. no. 48.227.

Photograph © Doris Duke Foundation for Islamic Art.

Using the size of known tiles and the buildings' plans, it is possible to estimate the number of tiles used in two buildings: the Imāmzāda Yaḥyā in Varamin, with many tiles dated to the 1260s, and the mausoleum of ʿAbd al-Ṣamad in Natanz, where tiles were added during a restoration project dated AH 707 (1307–8 CE) in a stucco inscription.<sup>47</sup> Nearly all tiles have been removed from the Imāmzāda Yaḥyā, a building constructed in several phases between 1261 and 1307.<sup>48</sup> The building's tiled mihrab (Fig. 10), now in the collection of the Doris Duke Foundation of Islamic Art in Honolulu, is dated Shaʿban 663 (May 1265) and signed ʿAlī b. Muḥammad b. Abī Ṭāhir.<sup>49</sup> It measures 3.85 × 2.29 m and is composed of more than sixty tiles.<sup>50</sup> A large number of tiles attributed to this site are found in museum collections; more than two hundred of these are dated between October 1262 and March 1263, suggesting a relatively rapid pace of production.<sup>51</sup> By carefully examining inscriptions in two monuments in Varamin—the Imāmzāda Yaḥyā and a tomb-tower built for ʿAlā al-Dīn Murtaḍā b. Fakhr al-Dīn Ḥasan al-Warāmīnī—Blair connects networks of patronage for architecture, tiles, and historical works. She identifies the patron mentioned in the stucco inscription added to the Imāmzāda Yaḥyā in AH 707 (1307–8 CE) as Malik Fakhr al-Dīn Ḥasan, a local powerholder who is mentioned in Ilkhanid sources between 1282 and his death on 20 Shaʿban 707 (February 14, 1308).<sup>52</sup> The source that records this last detail along with other aspects of Malik Fakhr al-Dīn Ḥasan's life is Abū al-Qāsim al-Kāshānī's *Tārīkh-i Uljaytū*, a history of the Ilkhanid sultan Uljaytu (r. 1304–16).<sup>53</sup> Thus, the circle closes, connecting a patron of Abū al-Qāsim al-Kāshānī—Malik Fakhr al-Dīn Ḥasan—to the shrine in Varamin for which Yūsuf b. ʿAlī created a panel of several tiles. The story does not, however, end there. As Blair points out, Malik Fakhr al-Dīn Ḥasan was also the patron of the tomb-tower of ʿAlā al-Dīn Murtaḍā, completed in AH 688 (1289–90 CE) and most likely built for the patron's father, who had passed away in AH 675 (1276 CE).<sup>54</sup> Blair explains the long gap between the father's death and the construction of the tomb with the fact that Malik Fakhr al-Dīn Ḥasan was probably a young boy in 1276 and built the tomb as soon as he had the power and means to do so two decades later.<sup>55</sup> The earlier tile decoration of the Imāmzāda Yaḥyā, added in the 1260s according to the dated wall tiles, may have taken place under the patronage of Malik Fakhr al-Dīn Ḥasan's father or grandfather.<sup>56</sup>

47. Blair, *Ilkhanid Shrine Complex*, 61–62; on the restoration project, see n. 96 below.

48. Wilber, *Architecture of Islamic Iran*, 109–11; S. S. Blair, "Architecture as a Source for Local History: The Example of Warāmīn," *Journal of the Royal Asiatic Society*, 3rd ser., 26, no. 1–2 (2016): 215–28. On the present life of this shrine, see K. Overton and K. Maleki, "The Emamzadeh Yahya at Varamin: A Present History of a Living Shrine, 2018–20," *Journal of Material Cultures in the Muslim World* 1 (2020): 120–49.

49. For detailed analysis of this object, see Blair, "Art as Text."

50. The weight of the mihrab is not recorded in the collections database, and since it is built into the wall within the exhibition, weighing it is not possible: email communication from Leslee K. Michelsen, who at the time of correspondence was the curator of collections, July 1, 2020.

51. Watson, *Persian Lustre Ware*, 191. Additional tiles in the Hermitage have dates extending to Rabīʿ II 661/March 1263: Blair, "Architecture as a Source," 217.

52. Blair, "Architecture as a Source," 220–23.

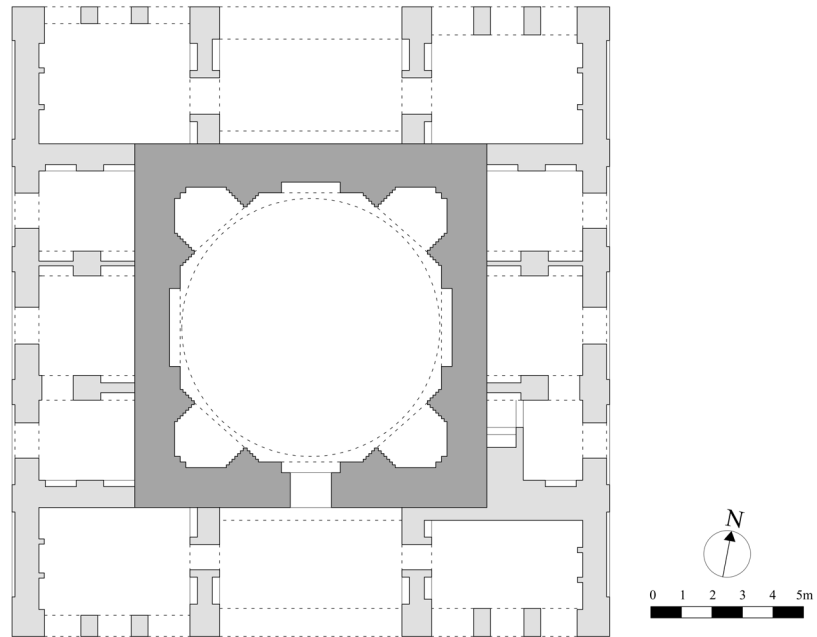
53. *Ibid.*, 223.

54. *Ibid.*, 224–25.

55. *Ibid.*, 225–26.

56. *Ibid.*, 226. Blair notes that structures predating the construction of the current tomb chamber in the

Fig. 11.  
Plan of Imāmzāda Yahyā,  
Varamin,  
AH 660–62 (1261–63 CE)  
and AH 705–7 (1305–7 CE).  
Redrawn by Matilde Grimadi  
after Donald N. Wilber, *The  
Architecture of Islamic Iran:  
The Il Khānid Period* (Prin-  
ceton, NJ: Princeton University  
Press, 1955), fig. 9,  
and Behzad Masoudi Asl et al.,  
“Mabānī mi‘mārī-yi maqābir-i  
imāmzādagān dar Īrān,”  
Bagh-i Nazar 15,  
no. 64 (2018), fig. 3.



The star and cross tiles attributed to the shrine measure roughly  $30.5 \times 30.5$  cm and are between 1.4 and 1.6 cm thick (see Fig. 1).<sup>57</sup> Relying on Donald Wilber’s plan of the building and assuming that the cross and star tiles reached a height of about 185 cm, we can estimate that about 750 tiles were needed to cover the dado zone, with gaps for the entrance and the mihrab (Fig. 11).<sup>58</sup> Additional tiles would likely have covered the sides of the cenotaph, although since the top panel, consisting of three tiles now in the State Hermitage Museum in St. Petersburg, is dated 10 Muharram 705 (August 2, 1305), it is unclear whether such tiles were added in the early fourteenth century or earlier.<sup>59</sup> A stucco inscription frieze was added directly above the dado of cross and star tiles in AH 707 (1307–8 CE).<sup>60</sup> It appears, therefore, that there was no inscription frieze made of luster tile above the cladding of cross and star tiles: it is highly unlikely that such a frieze would have been so damaged as to need removal less than fifty years after luster tiles were first installed at the site.

1260s may have existed at the site, as Jane Dieulafoy, in her 1881 travel account, describes and illustrates a larger complex that was destroyed in the meantime: Dieulafoy, *La Perse, la Chaldée et la Susiane*, 147–49. For a plan proposing a reconstruction of the building as seen by Dieulafoy, see Wilber, *Architecture of Islamic Iran*, fig. 6. Parts of the larger complex were still standing during Friedrich Sarre’s visit in 1897 or 1898: Sarre, *Denkmäler persischer Baukunst*, 59 and fig. 65, showing the portal and domed chamber.

57. Victoria and Albert Museum, London, *inv. no.* 1837L–1876 and *inv. no.* 1077A–1892; British Museum, London, *inv. no.* G.459 (all accessed October 28, 2020).

58. The length of the walls excluding the mihrab is 31.05 m according to Wilber’s plan in *Architecture of Islamic Iran*, figs. 6 and 9. To reach a height of about 185 cm, six rows of the large cross and star tiles would have been needed.

59. Blair, “Architecture as a Source,” 219–20. The panel in question at the State Hermitage Museum is *inv. no.* IP-1594 (accessed January 18, 2024).

60. Blair, “Architecture as a Source,” 220–21 and fig. 4, Blair argues that the cenotaph panel added in 1305 and the inscription dated 1307 were likely both part of a multiyear restoration campaign.

If a smaller tile of about  $20.5 \times 20.5$  cm weighs roughly 0.9 kg, the slightly larger ones from Varamin can be estimated to weigh about 1.2 kg each.<sup>61</sup> On the basis of these numbers, the dado tiles would have weighed about 735 kg. Much less predictable is the weight of the mihrab, as the size of individual tiles varies, as does their thickness. In terms of wall surface, the dado spans 56.24 m<sup>2</sup>, and the mihrab covers 8.8 m<sup>2</sup>. Deducing the mihrab's weight from that of the dado revetment may lead to a low-end estimate of about 115 kg. This number is certainly far too low, since the tiles used for mihrabs are generally thicker than cross and star tiles, as noted above.<sup>62</sup> Thus, a realistic weight estimate for the mihrab might be between 500 kg and 750 kg. Together with the dado tiles, that would bring the total weight of the tiles installed at the site in the 1260s to roughly 1,200–1,500 kg. It is important to note that such large numbers of tiles were exported from Kashan on a regular basis. Pack animals were abundant, making this possible, and tiles being flat, they were certainly easier to pack and less fragile (given their relative thickness) than the luster and *minā'ī* tiles that were also exported.<sup>63</sup>

In a recent article, Richard McClary has proposed a reconstruction of the tile revetment added in AH 707 (1307–8 CE) to the mausoleum of 'Abd al-Ṣamad in Natanz on the basis of tiles that he was able to locate in museum collections around the globe. Although few tiles remain on site, the imprints of tiles in the plaster show where they were located, as Blair notes in her monograph on the shrine.<sup>64</sup> Using this piece of information and tracing tiles attributed to the mausoleum of 'Abd al-Ṣamad in museum records, McClary was able to create a partial reconstruction and concept of the tile exhibit within a setting that reflects the building's interior. A major challenge in McClary's project was the often absent provenance information for tiles in museum collections. This is particularly true for tiles that were plundered and sold after the Qajar government prohibited the removal of tiles from religious buildings in 1876; rather than reducing the volume of theft, the implementation of this law led to the increasing anonymization of tiles appearing on the European art market.<sup>65</sup> The original program of interior decoration in the tomb consisted of the tile dado with interlocking cross- and star-shaped tiles topped by an inscription frieze, tiles on the mihrab and an arch framing it, tiles on the cenotaph, and stucco decoration on

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61. Exact weight data is not available from the British Museum, which holds a number of these tiles.

62. A tile from the mihrab of the Imāmzāda 'Alī b. Ja'far in Qum (now in the Metropolitan Museum of Art, inv. no. 40.181.6) has a thickness of up to  $2 \frac{5}{8}$  in. (6.7 cm). Four tiles from an inscription frieze attributed to the shrine of 'Abd al-Samad in Natanz (Metropolitan Museum of Art, inv. nos. 15.76.4, 15.76.5, and 15.76.6) are between 2.7 cm and 3.2 cm thick. Inv. no. x.111, a tile with otherwise similar measurements but carrying a passage from a different sura, suggesting that it was not part of the same frieze, is 4.4 cm thick.

63. On pack animals, especially Bactrian camels, see R. W. Bulliet, *The Camel and the Wheel* (New York: Columbia University Press, 1975, repr. 1990), 141–42 and 157.

64. Blair, *Ilkhanid Shrine Complex*, 64; Masuya, "Persian Tiles on European Walls," 41–44; R. P. McClary, "Re-contextualizing the Object: Using New Technologies to Reconstruct the Lost Interiors of Medieval Islamic Buildings," *International Journal of Islamic Architecture* 7, no. 2 (2018): 263–83, at 266 and fig. 1. In 2017, eighty-nine monochrome turquoise star-shaped tiles and one fragmentary luster tile remained on site: McClary, "Re-contextualizing the Object," 280n15 and 280n16.

65. McClary, "Re-contextualizing the Object," 266; Masuya, "Persian Tiles on European Walls," 50–51.

walls and a muqarnas dome. All in all, McClary was able to trace more than twenty tiles that had belonged to the epigraphic frieze at the upper edge of the dado, a panel of three joined tiles showing a small mihrab from the cenotaph, and thirteen tiles belonging to the mihrab and the mihrab recess. The mock-up of the partially reconstructed mihrab and the surrounding wall that McClary presents offers an impression of what the space would have looked like.<sup>66</sup> Supplementing McClary's findings with her own fieldwork, Anaïs Leone has placed parts of the surviving tiles in different sections of the building and proposed a new reconstruction of the dispersed mihrab.<sup>67</sup>

Such reconstructions reproduced by digital means in a museum setting can provide visitors with context about both the sites and the colonial historiographies that led to the tiles' removal. However, loose tiles held in museum collections also enable a study of weight and thickness. On site, traces in the plaster showing the imprints of tiles demonstrate that the total height of the dado was roughly 165 cm.<sup>68</sup> Tiles in the inscription frieze measure between 36 and 38 cm in height, bringing the height of the zone covered with cross and star tiles to about 130 cm.<sup>69</sup> The floor plan with niches on each side makes for an extensive wall surface despite the monument's relatively small size.<sup>70</sup> Overall, about thirty-five square meters of wall would have been covered with cross and star tiles, and about 750 to 800 cross and star tiles would have been needed to cover it; the total weight of the tiles would have been around 700–750 kg. Twenty tiles belonging to the inscription frieze have been identified in museum collections, but about seventy would have been needed to run around the interior of the building (leaving gaps for the entrance and the mihrab).<sup>71</sup> One might add that in some cases, tiles were finished over a number of months or even years (as in the case of the Imāmzāda Yaḥyā in Varamin, where wall tiles are dated 1262–63 and the mihrab 1265, so the tiles may have been delivered in several batches). The issue of transportation logistics connects directly to the design, construction, and installation of the tiles. Questions of logistics and weight are relevant not only for the final delivery but also for the production phase, which required fuel, clay, quartz, and various minerals and metals to produce the glazes.<sup>72</sup> As for construction sites elsewhere in the medieval Islamic world, little is known about this aspect of production, raising questions that need to be explored further.<sup>73</sup>

66. McClary, "Re-contextualizing the Object," 265–66. Notably, much of the stucco remains in place: Blair, *Ilkhanid Shrine Complex*, 37–39; McClary, "Re-contextualizing the Object," 265 and figs. 5 and 10.

67. Leone, "New Data on the Luster Tiles," 336–48.

68. Blair, *Ilkhanid Shrine Complex*, 64; McClary, "Re-contextualizing the Object," 266.

69. For a tile identified with this inscription frieze, dated Shawwal 707 (March 24–April 22, 1308), see Metropolitan Museum of Art, New York, *inv. no. 12.44* (accessed October 3, 2020).

70. Plan in Wilber, *Architecture of Islamic Iran*, fig. 23 in unpaginated plate section. According to André Godard, the interior of the shrine measures 5.95 × 5.95 m, and each of the four niches measures 0.86 × 2.14 m: A. Godard, "Naṭanz," *Athār-é Īrān* 1, no. 1 (1936): 75–106, at 92.

71. Metropolitan Museum of Art, *inv. no. 12.44*; Victoria and Albert Museum, London, *inv. no. 1485–1876* (accessed November 24, 2020); two tiles in the British Museum, London, *inv. no. OA+.1122* (accessed November 24, 2020). Unfortunately, no weight data is available for the frieze tiles.

72. See Allen, "Abū'l-Qāsim's Treatise," for these materials.

73. On the logistics and resources needed to produce cast bronze in medieval Germany, see I. Weinryb,

### From Design to Final Installation

How were the tile programs designed to fit the space they were intended for? The technical process of making the tiles themselves—from the creation of the frit body to the molding of the tiles, the addition of modeled inscriptions to some tiles, and subsequently the complex glazing and firing—is well known.<sup>74</sup> Molds were used several times, as shown by, for instance, the tiles attributed to or excavated at Takht-i Sulayman that carry identical, molded designs (such as dragons, or the episode of Bahrām Gūr and Āzāda on the hunt from the *Shāhnāma*; see Fig. 12).<sup>75</sup> Once the tiles had been molded, several complex steps followed: forming the letters of large inscriptions and attaching them to the drying tiles with liquid clay in a process known as luting; glazing the body; a first firing; the addition of the luster painting; and a second firing at a lower temperature.<sup>76</sup> But what of the process of design before the tiles could be made? This process would have involved the creation of a decorative program fit for a given site, decisions on the motifs and colors to be used and on the inscription passages to be included, and the calculation or estimation of the number of tiles that would need to be installed either in an existing structure or a in monument that was being constructed.



Fig. 12.

Frieze tile depicting Bahrām Gūr and Āzāda, ca. 1270–1300, production attributed to Kashan, possibly from Ilkhanid palace at Takht-i Sulayman.

Stone paste; in-glaze painted in blue, luster-painted on opaque white glaze, modeled 12 3/8 in. (31.4 cm) × 13 1/4 in. (33.7 cm).

Metropolitan Museum of Art, New York, Gift of Otto H. Kahn, 1910, accession number 10.56.2.

Photograph provided by the Metropolitan Museum of Art's Open Access program.

“Hildesheim Avant-Garde: Bronze, Columns, and Colonialism,” *Speculum* 93, no. 3 (2018): 728–82, at 734 and 739–43.

74. On the creation of these high-relief inscriptions, see S. S. Blair, “Luted Letters: The Relief Inscriptions on Kashan Luster Mihrabs,” in *Inscriptions of the Medieval Islamic World*, ed. B. O’Kane, A. C. S. Peacock, and M. Muehlhaeusler, 606–41 (Edinburgh: Edinburgh University Press, 2023).

75. The same mold could be used for numerous tiles: Naumann, *Die Ruinen von Tacht-e Suleiman*, 102–3; Masuya, “Ilkhanid Phase of Takht-i Sulaimān,” 227–29.

76. On technique, see Masuya, “Ilkhanid Phase of Takht-i Sulaimān,” 237–38; Allen, “Abū’l-Qāsim’s Treatise,” 115–20; A. Caiger-Smith, *Lustre Pottery: Technique, Tradition and Innovation in Islam and the Western World* (London: Faber and Faber, 1985), 76–80; Graves, “Kashan VII. Kashan Ware”; Blair, “Luted Letters,” 614–15.

Abū al-Qāsim al-Kāshānī's text provides insights into the use of materials for fritware and glazes, and some technical aspects of the making of lusterwares. He does not, however, address the process of designing either individual tiles or entire revetments. This omission reflects the nature of the larger work that contains the section on ceramics. 'Arā' is *al-jawāhir wa-nafā'is al-aṭāyib* (The brides of jewels and the gems of aromas<sup>77</sup>) is first and foremost a *javāhirnāma*, an established genre that describes the material, chemical, and at times medical properties of precious and semiprecious stones, metals, and minerals, as well as products that can be made with them.<sup>78</sup> Some of these texts, such as the *Javāhirnāma-yi Niẓāmī*, which was composed in AH 592 (1195–96 CE) by Muḥammad Abī Bakr Barakāt al-Jawharī al-Naysābūrī, also contain sections on ceramics, although their content differs significantly from that of Abū al-Qāsim's work.<sup>79</sup> The *Javāhirnāma-yi Niẓāmī* was certainly one of Abū al-Qāsim's sources, along with Naṣīr al-Dīn Ṭūsī's mid-thirteenth-century *Tansūkhnāma-yi Īlkhānī*; the latter replaces the section on ceramics with one on perfumes, which Abū al-Qāsim also includes.<sup>80</sup> The section on ceramics is the most original part of Abū al-Qāsim's work. It is based on his family background and perhaps on conversations with family members who worked in the tile industry, including his brother, Yūsuf.<sup>81</sup>

As scholars have long recognized, Abū al-Qāsim belonged to the Abū Ṭāhir family from Kashan, which produced and signed luster ceramics over several generations. Watson notes that although the family can be traced over three generations, there are often chronological gaps between the dated works of fathers and sons.<sup>82</sup> Works by members of the family are documented between 1205 and 1334, and these dated pieces include both tiles and vessels.<sup>83</sup> Abū al-Qāsim's brother, Yūsuf b. 'Alī, signed the tiles dated AH 705 (1305 CE) that decorated the cenotaph of the Imāmzāda Yaḥyā in Varamin for which his father had made a mihrab four decades earlier.<sup>84</sup> This is Yūsuf b. 'Alī's earliest surviving dated work. He made others between AH 709 and 727 (1310–27 CE); all of these are tiles rather than vessels.<sup>85</sup>

77. Masuya translates the title as "Precious Stones and Precious Perfumes": Masuya, "Ilkhanid Phase of Takht-i Sulaimān," 237.

78. Y. Porter, "Textes persans sur la céramique," in *La science dans le monde iranien à l'époque islamique: Actes du colloque tenu à l'Université des sciences humaines de Strasbourg*, ed. Ž. Vesel, H. Beikbaghban, and B. Th. de Crussol des Épesses, 165–89 (Tehran: Institut français de recherches en Iran, 1998); Y. Porter, "Le quatrième chapitre du *Javāher-nāme-ye Neẓāmī*," in *Sciences, techniques et instruments dans le monde iranien (X<sup>e</sup>–XIX<sup>e</sup> siècle)*, ed. N. A. Pourjavady and Ž. Vesel, 341–60 (Tehran: Institut français de recherches en Iran, 2004); Vesel, Afshar, and Mohebbi, "Le livre des pierres."

79. Vesel, Afshar, and Mohebbi, "Le livre des pierres," 149.

80. *Ibid.*, 149.

81. *Ibid.*, 145–46.

82. Watson, *Persian Lustre Ware*, 176; O. Watson, "Abū Ṭāher," in *Encyclopaedia Iranica*, 1(4): 385–87, 1983, updated 2011; S. S. Blair, "A Brief Biography of Abu Zayd," *Muqarnas* 25 (2008): 156–77; S. S. Blair, "Abu Tahir Family," *Grove Art Online*, 2003, updated 2010.

83. Watson, *Persian Lustre Ware*, 176 and 178–79.

84. Blair, "Architecture as a Source," 223, Watson, *Persian Lustre Ware*, 179.

85. Watson, *Persian Lustre Ware*, 179.

Collaborations between members of the Abū Ṭāhir family and those of other ceramic producers such as the al-Ḥusaynī and Abū Zayd families are also documented. Watson concludes that a limited number of highly specialized workshops were responsible for high-end ceramic production in Kashan.<sup>86</sup> Abū al-Qāsim did not enter the family trade but rather pursued a career as a historian within the orbit of the Ilkhanid ruling elite.<sup>87</sup> That Abū al-Qāsim was able to become an author of histories and a book of gems (which included a connection to his family's trade) and to move in the higher echelons of the Ilkhanid administration makes it clear that he had received a thorough education in his youth. This was likely also the case for his documented siblings Yūsuf (the tile maker) and 'Izz al-Dīn Maḥmūd, who was one of 'Abd al-Ṣamad's disciples at the shrine in Natanz.<sup>88</sup>

Even though archival documents from the Saljuq and Ilkhanid periods have not survived in large numbers (at least compared to the extensive Ottoman archive that stretches back to the fourteenth century), these forms of writing were part of an extensive documentary culture, much of which has yet to be explored and published. In this regard, it is important to heed Marina Rustow's call to not simply dismiss medieval Islamic polities as poor keepers of archives just because documents have not been preserved or, more poignantly, recognized as such by modern scholars.<sup>89</sup> Although Rustow's work focuses on the lost archive of the Fatimids, who ruled Egypt from 969 to 1171, thinking about expanded notions of what the archive is has a bearing on the study of Kashan ceramics as well. Inscriptions on tiles and vessels are part of that archive, even though they do not appear on paper.

In the case of Varamin, as noted above, local webs of patronage and production were prominent aspects of the commissioning and creation of tile revetments. Blair observes that two generations of the Abū Ṭāhir family produced tiles for two (or perhaps three) generations of Malik Fakhr al-Dīn Ḥasan's family. Both families were likely part of a close-knit network of Shi'i Muslims within the wider Kashan region. Such connections would have facilitated communication regarding tile commissions from initial contact to the execution of the details. Further, within such a context, patrons were likely to have seen luster tile revetments at major Shi'i shrines, including the early thirteenth-century one with two mihrabs at the shrine of Imām Riḏā in Mashhad, and in a sense would have known what they would get if they commissioned luster tiles from well-established producers in Kashan.

How did such collaborations work in practice? How was it determined how many tiles would be needed? Who measured the building if new tiles were to be added to an existing

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86. Watson, *Persian Lustre Ware*, 177.

87. Soucek, "Abū'l-Qāsem 'Abdallāh Kāšānī"; Amanat and Mottahedeh, "Medieval Kashan," 410–11.

88. On 'Izz al-Dīn Maḥmūd, see S. S. Blair, "A Medieval Persian Builder," *Journal of the Society of Architectural Historians* 45, no. 4 (1986): 389–95, at 395. In the same article (at 395), Blair notes that "the Natanz work [at the shrine of 'Abd al-Ṣamad] also tells us about the aesthetic, artistic, and social values in Mongol Iran where luster potters were also builders and where luster pottery was such a restricted and respected career that it ranked with bureaucracy and mysticism. One can only imagine that it was similarly lucrative."

89. M. Rustow, *The Lost Archive: Traces of a Caliphate in a Cairo Synagogue* (Princeton, NJ: Princeton University Press, 2020), 1–6.

structure? If a new monument was built, were tiles produced concurrently with construction as soon as the structure's ground plan and height were known? What proportion of tiles was custom-made? How many tiles were readily available in storage? How long did it take to produce a full tile revetment? And how did tile makers and architects<sup>90</sup> (for lack of a better term) coordinate the work? Would sample tiles be sent to patrons for approval of, for instance, inscriptions, background motifs, and color schemes? The following section investigates these questions.

In the case of the Imāmzāda Yaḥyā in Varamin, dated examples indicate that wall tiles were produced between Dhu al-Hijja 660 and Rabi' II 661 (October 1262 and March 1263), although the possibility that further tiles were produced a few months earlier or later cannot be excluded.<sup>91</sup> The mihrab, signed by 'Alī b. Muḥammad b. Abī Ṭāhir, is dated Sha'ban 663 (May 1265).<sup>92</sup> We do not know what caused the two-year gap. It is possible that the mihrab took a long time to complete considering that it involved a significant amount of work. 'Alī b. Muḥammad's workshop could also have worked on other commissions (including vessels) in the same period. Nothing suggests that making the tile revetment for the Imāmzāda Yaḥyā constituted an exclusive contract.

Since the Varamin mihrab carries only one signature, we cannot be sure of 'Alī b. Muḥammad's role in creating it, nor should we assume that the mention of his name automatically makes him its chief designer. Considering the complex process of making fritware with luster decoration, it is abundantly clear that many workers would have been needed to create programs of this scale. The cenotaph panel dated AH 705 (1305 CE) from the Imāmzāda Yaḥyā contains further information in this regard.<sup>93</sup> On it, the name Yūsuf b. 'Alī [b.] Muḥammad is preceded by the word "work of" (*'amal*). A further signature appears at the bottom of the central niche: *ṣana'at* (the fashioning or design of) 'Alī b. Aḥmad b. 'Alī al-Ḥusaynī.<sup>94</sup>

90. On the role of the architect in the medieval Islamic world, see D. Behrens-Abouseif, "Muhandīs, Shād, Mu'allim: Note on the Building Craft in the Mamluk Period," *Der Islam* 72, no. 2 (1995): 293–309; N. Rabbat, "Design without Representation in Islamic Egypt," *Muqarnas* 25 (2008): 147–53; S. Babaie, "Chasing after the Muhandīs: Visual Articulations of the Architect and Architectural Historiography," in *Affect, Emotion, and Subjectivity in Early Modern Muslim Empires: New Studies in Ottoman, Safavid, and Mughal Art and Culture*, ed. K. Rizvi, 21–44 (Leiden: Brill, 2018).

91. Watson, *Persian Lustre Ware*, 191 (with dates between Dhu al-Hijja 660 and Muharram 661/October and December 1262); Blair, "Architecture as a Source," 217, noting that some tiles in the Hermitage in St. Petersburg extend the date range to Rabi' II 661 (March 1263).

92. Blair, "Art as Text," 409; Watson, *Persian Lustre Ware*, 179.

93. State Hermitage Museum, St. Petersburg, *inv. no. IP-1594* (accessed July 27, 2024).

94. Blair translates *ṣana'at* as "decoration" in "Architecture as a Source," 220; Watson translates it as "fashioned" in *Persian Lustre Ware*, 176. In an earlier publication, Blair also mentions the signature "'Alī b. Aḥmad Bābawayh" on this mihrab, but this appears to be a misreading of 'Alī b. Aḥmad b. 'Alī al-Ḥusaynī, a name that is not mentioned in the article in question: Blair, "Medieval Persian Builder," 391 and 395. Watson comments: "In one mihrab, signed by two potters, one name is prefixed by *'amila*, the other by *sana'a*, this man also calling himself *al-katibi* 'the scribe' (page 136 and 179). This tends to suggest that *sana'a* refers to design, leaving *'amila* to indicate the purely ceramic processes. Such technical terms are notoriously difficult

At the shrine of ‘Abd al-Ṣamad in Natanz, a signature in the stucco work has taken center stage in discussions of the roles of those involved in the building’s Ilkhanid phase. Earlier publications argued that the mausoleum was built in the fourteenth century, although other parts of the larger complex, which also contains a Friday mosque and a *khāhqāh* (structure reserved for Sufi communities), have been attributed to earlier dates.<sup>95</sup> In a recent study, McClary and Ana Marija Grbanovic use the structure’s masonry, masonry joints, and stucco techniques to argue that parts of the mausoleum date back to the Saljuq period and that the fourteenth-century campaign was one of restructuring and redecoration.<sup>96</sup>

Who was involved in this project? In her study of the site, Blair notes that Ḥasan b. ‘Alī b. Aḥmad Bābawayh must have been the “chief decorator” of the work done in 1305–7.<sup>97</sup> The name appears carved into the stucco of several engaged corner colonettes.<sup>98</sup> More recently, McClary and Grbanovic have published a new reading, supplied by Bruce Wannell and the late Abdullah Gouchani, that adds the words *bannā vidgūlī* or “the builder from Vidgul,” a town near Nushabad in close proximity to Kashan.<sup>99</sup>

In a tile panel attributed to the site, the text *‘amal Ḥasan ‘Alī b. Aḥmad Bābawayh al-bannā[ ]* appears prominently, written in large letters in raised ceramic script, to the left and right of the mihrab niche that adorns the panel, along with further inscriptions. This tile panel is often thought to have come from the top of ‘Abd al-Ṣamad’s cenotaph at the site, in part given the similarity of the names used in the signatures.<sup>100</sup> Recently, however, several scholars have cast doubt on this provenance.<sup>101</sup> Nevertheless, it is possible to use this tile panel to shed light on roles at construction sites. On the tile panel, Ḥasan ‘Alī b. Aḥmad Bābawayh is named as a builder (*al-bannā[ ]*), a term that is wide open to interpretation and raises questions when it appears on a tile rather than directly on a building. A second inscription on the same tile, included in the tiny script along the outer edge, mentions that the calligraphy was completed by ‘Alī b. Muḥammad b. Faḍl Allāh.<sup>102</sup> The name is preceded by a fragmentary date, written out in words, of which only *sanat tis* ‘, “year nine[...],” is clearly legible. According to Blair, given that ‘Abd al-Ṣamad died in AH 699 (1299–1300 CE)

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to identify precisely, if indeed they were ever used in a precise fashion, and this suggestion is made with due reservation.” Watson, *Persian Lustre Ware*, 176.

95. Blair, *Ilkhanid Shrine Complex*; A. Godard, “Naṭanz”; Wilber, *Architecture of Islamic Iran*, 133–34.

96. A. M. Grbanovic and R. P. McClary, “On the Origins of the Shrine of ‘Abd al-Ṣamad in Natanz: The Case for a Revised Chronology,” *Journal of the Royal Asiatic Society* 32, no. 3 (2022): 501–34.

97. Blair, *Ilkhanid Shrine Complex*, 40.

98. *Ibid.*, 40 and 62; McClary, “Re-contextualizing the Object,” 269 and fig. 5.

99. Grbanovic and McClary, “On the Origins,” 519, 519n69, and fig. 13 for all the capitals. The stucco mihrab at Mahallat-i Bala also appears to contain that name component: Blair, “Medieval Persian Builder,” figs. 3 and 4.

100. Blair, *Ilkhanid Shrine Complex*, 65; Blair, “Medieval Persian Builder,” 390; McClary, “Re-contextualizing the Object,” fig. 4; Metropolitan Museum of Art, New York, *inv. no. 09.87* (accessed September 9, 2020).

101. Grbanovic and McClary, “On the Origins,” 18n48, noting that Blair and Gouchani have doubted the provenance. Possible alternatives are the Mahallat-i Bala shrine and the mihrab of the Great Mosque of Natanz.

102. *Khaṭṭ al-‘abd al-ḍa‘īf ‘Alī b. Muḥammad b. Faḍl Allāh*; my reading. The name appears upside down in the bottom right corner (although directionality would not have been an issue since this panel likely lay flat atop a box-shaped cenotaph).

and the patron of the shrine, Zayn al-Dīn al-Māstarī, was executed and construction stopped in AH 711 (1312 CE), the most likely date for the tile panel is AH 709 (1310 CE), since the first number in that hijri year when written out in words is nine (Arabic *tis*).<sup>103</sup>

Does this tile panel present a situation similar to that of the cenotaph tiles from the Imāmzāda Yaḥyā in Varamin, on which both a tile maker and a calligrapher/scribe are mentioned? The joint inscriptions are certainly a sign of collaboration in the creation of tiles and on construction sites, but it is difficult to discern what applied strictly to tiles and what was valid for building projects more broadly. In interpretations of the tile traditionally attributed to Natanz, the focus has been on Ḥasan ‘Alī b. Aḥmad Bābawayh’s role. Blair argues that because his name appears on this tile, he must have been a potter.<sup>104</sup> She attributes the fact that the name also appears on the capitals in Natanz to the fact that someone familiar with tile could also have worked with stucco—something that, in her view, would have come naturally to a tile maker.<sup>105</sup> A point in favor of this argument is that making the molds for tiles required complex skills in working with stucco, the material that most surviving molds were made of.<sup>106</sup> Supporting this argument, the signature “Ḥasan ‘Alī b. Aḥmad Bābawayh” also appears on a stucco mihrab dated AH 736 (1335–36 CE) in the shrine of Abū Faḍl and Yaḥyā in Mahallat-i Bala, between Qum and Isfahan.<sup>107</sup>

But does this necessarily mean that Ḥasan ‘Alī b. Aḥmad Bābawayh worked in both tile and stucco? Was he the “chief decorator” who was present on site to install tiles and carve stucco, as Blair suggests?<sup>108</sup> Consider Blair’s observation that “it is no accident that luster potters were involved in construction, for their work molding luster tiles made them well prepared to execute the molded and carved units for muqarnas domes.”<sup>109</sup> The term *al-bannā*’ on the tile inscription gives reason to pause. Literally, it means “builder,” but it could cover a wide range of meanings from mason to supervisor, architect, and engineer. What if Ḥasan had a supervisory role at the shrine of ‘Abd al-Ṣamad, and this is why his name ended up on both tile and stucco (assuming that he was indeed responsible for some of the stucco at Natanz, too)?

Regardless, workers would have been needed to install the tiles delivered to building sites. Some expertise in installing and assembling tiles would have been necessary, but this does not have to mean that many workers traveled from Kashan along with the tiles.

103. Blair, “Medieval Persian Builder,” 393–94. Blair identifies the month as Shawwal, but only the final letter (*lām*) of the month is visible. The full year in this case would be *tis*‘ *wa-sab*‘a *mi*’a, since 709 in Arabic reads as “nine and seven hundred.”

104. Blair, *Ilkhanid Shrine Complex*, 40 and 65.

105. Blair, *Ilkhanid Shrine Complex*, 65.

106. Watson, *Ceramics of Iran*, 402. For an example of a mold, see Naumann, *Tacht-e Suleiman*, fig. 86.

107. Blair, “Medieval Persian Builder,” 391 and figs. 3 and 4; Blair, *Ilkhanid Shrine Complex*, 39. Again, Blair reads Ḥasan b. ‘Alī b. Aḥmad Bābawayh, but in this inscription as on the mihrab tile in the Metropolitan Museum of Art, there clearly is no “ibn” between Ḥasan and ‘Alī. A final word or two is illegible according to Blair, “Medieval Persian Builder,” 391. It might possibly read al-Ṭidgūlī, as suggested by Gouchani for the stucco capitals at Natanz according to Grbanovic and McClary, “On the Origins,” 519.

108. Blair, *Ilkhanid Shrine Complex*, 40.

109. Blair, “Medieval Persian Builder,” 394.

Examining placement marks on tiles in Khwarazm, Bernard O’Kane notes that tiles that contained inscriptions could easily have been installed without such marks and that existing examples at the shrine of Najm al-Dīn Kubrā (ca. 1330 CE) in Kuhne Urgench indeed have such marks only on tiles without text.<sup>110</sup> (Such marks were not used in Kashan.) In cases when the inscriptions contained well-known Qur’an passages, any literate Muslim could presumably have figured out the arrangement on their own, and in the case of mihrabs they would have been further guided by edges and corners, jigsaw puzzle-style. A much larger workforce, well beyond the individuals whose names appear on the tiles, was certainly needed to produce the tiles in Kashan itself. The named men were likely masterminds, workshop owners, and designers, but given the large number of tiles produced they could not possibly have made every single tile themselves.

One specialized aspect of design would have been the creation of inscription programs geared to the specific site at which the tiles would be installed. Thus, tiles for the Ilkhanid palace at Takht-i Sulayman contained passages from the *Shāhnāma*, which would have highlighted the site’s royal aspects.<sup>111</sup> A similar strategy was followed in stone on the city walls of the Rūm Saljuq capital of Konya, Turkey, in the late twelfth and early thirteenth centuries.<sup>112</sup> Yves Porter has argued that some tiles with passages from the *Shāhnāma*, generally attributed to Takht-i Sulayman, may have come from other Ilkhanid palatial sites that are yet to be identified or are known from written sources but have disappeared from the archaeological record.<sup>113</sup>

At a basic level, the collaboration between designers, builders, and tile makers could have started in the early stages of a project, even before construction. A tile revetment could be planned and designed as soon as the size of the building was known, since all that was needed to get started on tiles was basic measurements to calculate the surface area. Cross and star tiles were produced in standard sizes of roughly 30 cm in the pre-Mongol period and 20.5 cm in the Ilkhanid period.<sup>114</sup> Both sizes can be related to units of measurement used in medieval Iran, particularly the small Hashimi cubit, which measured about 60.5 cm; thus, the pre- and post-Mongol sizes correspond to approximately one-half and one-third of this unit, respectively.<sup>115</sup> Some caution is necessary in the case of inscription friezes that needed to be measured carefully to fit; unlike cross and star tiles, they could not be cut down if they were too large without losing part of the text. Thus, inscription friezes perhaps had to be made only once the building was completed and the cross and star tiles

110. B. O’Kane, “From Atelier Floor to Monument Wall: How Were Tiles Placed Correctly?,” in *Against Gravity: Building Practices in the Pre-industrial World*, ed. R. Ousterhout, D. Borbonus, and E. Dumser (Philadelphia: Center for Ancient Studies, University of Pennsylvania, 2016), 1–2.

111. Ghouchani, *Ash’ār-i Fārsī-i Kāshihā-yi Takht-i Sulaymān*.

112. S. Yalman, “Building the Sultanate of Rum: Memory, Urbanism and Mysticism in the Architectural Patronage of ‘Ala al-Din Kayqubad (r. 1220–1237)” (PhD diss., Harvard University, 2011), 40–54.

113. Porter, “‘Talking’ Tiles.”

114. As noted above, the tiles from Varamin are an exception in that they measure ca. 30 cm despite their later date.

115. W. Hinz, *Islamische Masse und Gewichte: Umgerechnet ins metrische System* (Leiden: E. J. Brill, 1955), 58; W. Hinz, “*Dhirā*,” in *Encyclopaedia of Islam*, 2nd ed., ed. P. J. Bearman et al. (Leiden: Brill, 1954–2009).

had been installed, as in Natanz. Such a staged process may also explain why dated tiles made for the same site were at times produced over the course of several years. Still, in the case of new construction, there was no reason for tile makers to wait around until the building was completed before beginning to make tiles. If we consider the example of Varamin, where the creation of the tiles stretched over four years according to the dated examples, simultaneous progress in construction and tile making would have been a much more efficient way to run a construction project and to ensure speedy completion. Even in cases where tile revetments were added to existing buildings, as in the shrine of Imām Rizā in Mashhad, the process could unfold over the course of several years, and additions made several decades after an initial intervention could happen, as the mihrabs dated AH 612 (1215 CE) and AH 640 (1242 CE), confirm.<sup>116</sup>

Once a tile revetment was completed, Blair argues that someone would likely have been sent along with the complete order to direct installation on site.<sup>117</sup> This is entirely possible, but was it necessary? Tiles had been made to careful measurements, using standardized molds, and could perhaps have been sent with written instructions; further, the mortar gap provided some flexibility in installation. Moreover, the measurements of the building that were needed to produce the tiles could also have been sent in a letter, perhaps accompanied by a sketch plan. Given the extensive communication systems in place in Iran under both Saljuq and Ilkhanid rule for the purposes of trade and administration, nothing precludes a similar approach to building projects.

### “Masters of Tabriz”

Returning to the production and installation of revetments in black-line tile in the fifteenth-century Ottoman Empire, the observations made above regarding collaboration, design, and logistics in Kashan provide a helpful basis for a much-needed reassessment of workshop practices. Unlike in Kashan, where signatures and dates on tiles allow the reconstruction of family workshops over generations, little such information is available on fifteenth-century tile makers within the Ottoman Empire.

The only surviving signature on a tile is that of the “Masters of Tabriz” in Persian (*‘amal-i ustādhān-i Tabrīz*), which appears on the mihrab of Mehmed I’s mosque-*zāviye* (1419–21) in Bursa, Turkey (Figs. 13 and 14). The signature is paired with a verse by Sa‘dī: “The thoughts of an oppressor who has been cruel to us remain around his neck forever, but they pass over us.”<sup>118</sup> The mihrab, and the tile on which the signature appears, are made using black-line technique.<sup>119</sup> In this technique, which appears in Timurid Central Asia in

116. Blair, “Art as Text,” figs. 5–8.

117. Blair, *Ilkhanid Shrine Complex*, 40.

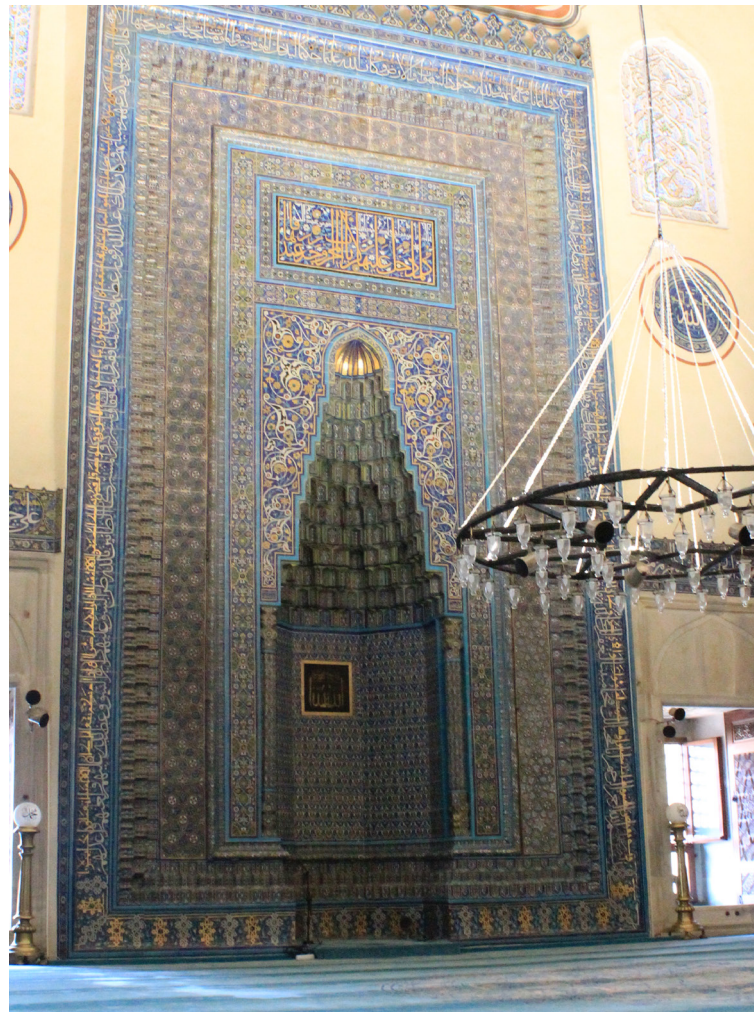
118. F. Taeschner, “Die Ješil Ğami in Brussa, ihre historischen Inschriften und ihre Künstler,” *Der Islam* 20 (1932): 139–68, at 144; Shaykh Sa‘dī of Shiraz, “On the Conduct of Kings,” in *The Gulistan (Rose Garden) of Sa‘dī*, ed. and trans. W. M. Thackston (Bethesda: Ibex, 2008), 39, cited in V. Poier, “The Green Complex of Sultan Mehmed I and Its Context” (PhD diss., Harvard University, 2021), 37.

119. On the process of black-line tile production, sometimes mistakenly called *cuerda seca*, see O’Kane, “Tiles of Many Hues.”

the late fourteenth century, black (and at times red) outlines are placed over a uniform slip that has been fired beforehand. During a second firing, these lines prevent various pigments that are added between them from running into each other.<sup>120</sup> Black-line tiles are also used on the mihrab, cenotaph, and medallions in the wall revetment of Mehmed I's mausoleum, built after his death in 1421 and located next to the mosque-zāviye.<sup>121</sup> The mosque-zāviye's mihrab is the only signed example of black-line tile from the Ottoman Empire. Overall, Ottoman ceramics were hardly ever signed by their makers. A rare and hence famous signed and dated example is the so-called Abraham of Kütahya ewer, dated 959 in the Armenian calendar (1510 CE).<sup>122</sup>

Fig. 13. (right)  
Mihrab of Mehmed I's mosque-zāviye,  
Bursa, 1419–21.  
Photograph by the author, 2022.

Fig. 14. (below)  
Signature of the “Masters of Tabriz”  
in the mihrab of Mehmed I's  
mosque-zāviye, Bursa, 1419–21.  
Photograph by the author, 2022.



120. A. Samkoff, “From Central Asia to Anatolia: The Transmission of the Black-Line Technique and the Development of Pre-Ottoman Tilework,” *Anatolian Studies* 64 (2014): 199–215, at 200–201; O’Kane, “Tiles of Many Hues,” 200–203.

121. Blessing, “Seljuk Past and Timurid Present”; M. Bernus-Taylor, “Le décor du ‘Complexe Vert’ à Bursa, reflet de l’art timouride,” in *L’héritage timouride, Iran—Asie centrale—Inde, XV<sup>e</sup>–XVIII<sup>e</sup> siècles*, ed. M. Szuppe, 251–66 (Tashkent: Institut français d’études sur l’Asie centrale, 1997).

122. British Museum, London, *inv. no. G.1* (accessed March 27, 2024).



Fig. 15. Monochrome tile with black-line tile medallion in the hallway between vestibule and prayer hall, Mehmed I's mosque-zāviye, Bursa, 1419–21. Photograph by the author, 2016.



Fig. 16. Inscription in black-line tile and dado tiles with gold overlay in west iwān, Mehmed I's mosque-zāviye, Bursa, 1419–21. Photograph by the author, 2016.

The mosque-zāviye's tile revetment does not consist entirely of black-line tiles; this technique is reserved for the mihrab, the inscription bands running along the top of the dado zones (Fig. 15), the sultan's lodge on the building's upper level, and the medallions in the entryway (Fig. 16). The tiles in the dado zones are hexagonal and monochrome turquoise or, in some cases, adorned with gold overlay (see Fig. 15).<sup>123</sup> Despite the varied array of tile techniques present in the mosque-zāviye, the entire tile revetment has been attributed to the "Masters of Tabriz," even though the signature does not specify whether it applies only to the mihrab or also to further tiles across the building complex, and if the latter, to which types of tiles. A further signature, that of "Muḥammad the Mad" (*Muḥammad al-majnūn*), appears on a black-line tile in the entrance arch of the sultan's lodge on the building's upper floor.<sup>124</sup>

123. This technique also appears in the Karatay Madrasa (1251–52) in Konya and the Çinili Köşk (1472) in Istanbul: Blessing, "Seljuk Past and Timurid Present," 248, and P. Blessing, *Architecture and Material Politics in the Fifteenth-Century Ottoman Empire* (Cambridge: Cambridge University Press, 2022), 30–31.

124. Mantran, "Les inscriptions arabes," 94, no. 10; Taeschner, "Ješil Ğami," 145; Poier, "Green Complex," 15–16 and fig. 207, appendix 1.1.8.



Fig. 17.

Mihrab of the Ibrahim Bey Imaret, Karaman, 1432.  
Çinili Köşk, Istanbul Archaeological Museum.  
Photograph by the author, 2015.



Fig. 18.

Detail of mihrab of the Muradiye Mosque, Edirne,  
1435–36.  
Photograph by the author, 2019.

Black-line tiles are quite rare in the Ottoman Empire. They also appear on the mihrab of the Muradiye Mosque (839/1435–36) in Edirne, on the exterior of the mosque-zāviye of Murad II (Rajab 828–Muḥarram 830/May 1425–November 1426) in Bursa, and in the Şah Melek Mosque (Ramaḍan 832/June–July 1429) in Edirne. Further, black-line tiles were used for the mihrab of the Ibrahim Bey Imaret in Karaman (1432), now in the Istanbul Archaeological Museum (Fig. 17). Isolated tiles in museum collections are attributed to Konya and Karaman in the late fourteenth and early fifteenth centuries in connection with the documented restoration of the tomb of Mawlānā Jalāl al-Dīn Rūmī (d. 1273) in Konya in AH 783 (1381 CE) and the Ibrahim Bey Imaret.<sup>125</sup> Rūmī's mausoleum was remodeled multiple

125. Samkoff, "From Central Asia to Anatolia," 200–204; Meinecke, *Fayencedekorationen seldschukischer Sakralbauten*, 1:108–9.

times in later centuries, and the fourteenth-century revetment does not survive.<sup>126</sup> In the Ottoman Empire, borders in black-line tile were also used in the Cem Sultan Mausoleum within the Muradiye complex in Bursa. The mausoleum was built in 1479 and remodeled in 1499 before Cem, the long-exiled brother of Sultan Bayezid II, was buried there. It is unclear when these tiles were installed.<sup>127</sup> A set of later examples in Istanbul and Gebze, dating from between the 1520s and the 1540s, is associated with tile makers brought from Tabriz after the Ottoman sultan Selim I briefly captured that city in 1514, rather than a continuation of the fifteenth-century production.<sup>128</sup>

Crucially, given the signature in Mehmed I's mosque-*zāviye* in Bursa, the entire fifteenth-century corpus of black-line tiles is often attributed to the "Master of Tabriz." How Muḥammad al-Majnūn figures into the equation is not quite clear. Veronika Poier has suggested that he supervised the tilework, without discussing whether he might have been part of the "Masters of Tabriz" or a supervisor previously active in the Ottoman system.<sup>129</sup> Recent studies have shown that collaborative settings in which workers from different contexts within and beyond the Ottoman realm were brought together were a hallmark of Ottoman elite patronage from at least the late fourteenth century onward. Viziers or other courtiers could serve as building supervisors. On the mosque-*zāviye* of Mehmed I, for example, Hacı İvaz Pasha is named in an inscription that points to such a role, and he is also credited by Ottoman historians of the late fifteenth century with hiring foreign artists (of unnamed origin) for the Ottoman court.<sup>130</sup> Extending the "Masters of Tabriz" narrative created for Bursa, other types of tiles that were produced around the same time, such as the blue-and-white underglaze painted tiles that adorn the walls of the qibla *īwān* at the Muradiye Mosque (AH 839 / 1435–36 CE) in Edirne and form part of the mihrab (Fig. 18) together with black-line tiles, are also attributed to this group of tile makers.<sup>131</sup>

Ottoman archival sources and histories do not mention the "Masters of Tabriz," nor are any of the other works attributed to them signed. No evidence of kilns with wasters of black-line tile has been found in Bursa, Edirne, or Karaman. And yet the "Masters of Tabriz" are generally presumed to have been members of an itinerant workshop that moved its entire production to a new city each time it completed a project and that was able to operate at a large scale.<sup>132</sup> However, there is no evidence for these movements beyond the fact that tiles

126. Samkoff, "From Central Asia to Anatolia," 199–201, with the example of two matching tiles in the Metropolitan Museum of Art, New York, *inv. nos.* 08.185a, b (accessed August 12, 2024).

127. Blessing, *Architecture and Material Politics*, 164–65.

128. F. Yenişehirlioğlu, "Les grandes lignes de l'évolution du programme décoratif en céramique des monuments ottomans au cours du XVI<sup>e</sup> siècle," *Erdem* 1 (1985): 456–65; G. Necipoğlu, "From International Timurid to Ottoman: A Change of Taste in Sixteenth-Century Ceramic Tiles," *Muqarnas* 7 (1990): 136–70.

129. Poier, "Green Complex," 16, 36, 158.

130. Z. Yürekli, "Architectural Patronage and the Rise of the Ottomans," in *A Companion to Islamic Art and Architecture*, ed. F. B. Flood and G. Necipoğlu, 1:733–54 (Hoboken, NJ: John Wiley & Sons, 2017); Blessing, *Architecture and Material Politics*, 78–79.

131. P. Blessing, "Blue-and-White Tiles of the Muradiye in Edirne: Architectural Decoration between Tabriz, Damascus, and Cairo," *Muqarnas* 36 (2019): 101–29, at 104–8.

132. Full literature review in Blessing, "Seljuk Past and Timurid Present," and Blessing, *Architecture and Material Politics*, 76–79.

attributed to (rather than signed by, except in the case of Mehmed I's mosque-*zāviye* in Bursa) the "Masters of Tabriz" survive in monuments in Bursa, Edirne, and Karaman built between the late 1410s and the late 1430s. Even more problematically, later black-line tiles in Bursa, dating to the 1470s or 1490s, as well as late fifteenth-century tiles using other techniques in Istanbul, are sometimes also attributed to the "Masters of Tabriz."<sup>133</sup>

In my work on fifteenth-century Ottoman architecture, I have noted the weaknesses of this narrative and pointed out that there is no reason to assume that the tiles installed in the monuments of Bursa and Edirne (and outside of Ottoman lands in Karaman) had to be produced on site. Like tiles made in Kashan, they could have been transported to the sites where they were installed. If that is the case, where were these tiles made? The blue-and-white tiles at the Muradiye Mosque, both those on the mihrab and those on the lateral walls of the qibla *īwān*, could plausibly have been produced in Iznik in view of the evidence of vessels of related types recovered there and dating back to the fourteenth century.<sup>134</sup> Could black-line tiles also have been produced in Iznik? This remains an open question, but clearly, the narrative of an itinerant workshop does not rest on a solid source base. Therefore, it is entirely possible that tiles were produced at one site (Bursa? Iznik?) and then transported to the places where they were installed. The above discussion of design and logistics in Kashan from the late twelfth to the mid-fourteenth century shows how such an operation could function.

## Conclusion

Necessary for a full understanding of how communication of measurements and perhaps plans related to construction and decoration projects might have worked is a consideration of the role of paper in architectural planning. The increasing prevalence of paper in the Islamic world beginning in the fourteenth century, particularly within the Mongol Empire, led to a steep increase in manuscript production and written communication in general.<sup>135</sup> Even though no architectural drawings on paper have been preserved from this period, related evidence shows that the practice of drawing up elements of architecture was known. An incised stone slab found at the site of the Ilkhanid palace of Takht-i Sulayman is crucial in this regard. Attributed to the 1270s based on the site's date, the slab's incised lines have been interpreted as a drawing directing the construction of a muqarnas vault, especially in the light of mathematical texts from the same period.<sup>136</sup> Beginning in the fifteenth century, a greater number of drawings that could have had a bearing on architectural design have been preserved. These include the so-called Topkapı Scroll, a series of designs that Gülru

133. Aube, *La céramique dans l'architecture en Iran*, 201–6.

134. See note 7 above.

135. J. M. Bloom, *Paper before Print: The History and Impact of Paper in the Islamic World* (New Haven, CT: Yale University Press, 2001), 161–201. Bloom argues (at 186–89) that paper templates were used in the decoration of ceramic vessels from Kashan.

136. Y. Dold-Samplonius and S. L. Harmsen, "The Muqarnas Plate Found at Takht-i Sulayman: A New Interpretation," *Muqarnas* 22 (2005): 85–94; A. Ghazarian and R. G. Ousterhout, "A Muqarnas Drawing from Thirteenth-Century Armenia and the Use of Architectural Drawings during the Middle Ages," *Muqarnas* 18 (2001): 141–54, at 145–46.

Necipoğlu dates to the fifteenth century and places in Turkmen territory in Iran and eastern Anatolia. She argues that the drawings in this presentation copy relate to ones used in the design and construction of elements such as muqarnas vaults and tile patterns for wall revetments.<sup>137</sup>

The recent edition of a fifteenth-century treatise on the practical application of mathematics and geometry gives insights into the ways in which patterns were designed. on the topic corroborates this point.<sup>138</sup> Such treatises involve larger questions of theory and practice—*‘ilm* and *‘amal*, or knowledge and work in Arabic—which is a topic at the center of recent studies on the history of science in the Islamic world. Thus, histories of technologies are central here, and architecture must become part of these discussions. Further, regarding design practices that increasingly revolve around and rely on the use of paper, we can observe concurrent developments in northern European, Italian, and Ottoman contexts as well as in the Timurid realm in Iran and Central Asia.<sup>139</sup>

Whereas such documentation is more widely available for the fifteenth and sixteenth centuries, it is rare for the twelfth to fourteenth centuries, the period in which Kashan tile revetments were designed, produced, and installed. This is true for the Islamic world as much as it is for medieval Europe, where rare records such as Villard de Honnecourt’s early thirteenth-century drawings have long prompted discussion about the extent to which they reflect design processes rather than drawn renderings of a finished structure.<sup>140</sup> The rare drawings that do exist are related to plans and structures such as vaults and windows. Interior decoration is conspicuously absent from the earlier examples, and later ones such as the Topkapı Scroll include designs that can be applied to any surface—inside or out—rather than specific designs for interior spaces. The case of tile revetments produced in Kashan between the late twelfth and mid-fourteenth centuries does, however, show that such programs must have been produced in close collaboration with the architects and engineers responsible for creating buildings. Only such collaboration in which tile makers played a central role could guarantee that tiles were produced to measure and delivered to construction sites in the required quantities.

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137. G. Necipoğlu, *The Topkapı Scroll: Geometry and Ornament in Islamic Architecture* (Los Angeles: Getty Center for the History of Art and the Humanities, 1995), 9 and 29–53.

138. G. Necipoğlu, ed., *The Arts of Ornamental Geometry: A Persian Compendium on Similar and Complementary Interlocking Figures* (Leiden: Brill, 2017); on the tradition of such practical geometry, see also Necipoğlu, *Topkapı Scroll*, 167–75, and G. Necipoğlu, “Ornamental Geometries: A Persian Compendium at the Intersection of the Visual Arts and Mathematical Sciences,” in Necipoğlu, *Arts of Ornamental Geometry*, 11–78.

139. Babaie, “Chasing after the Muhandis”; S. S. Blair and J. M. Bloom, “From Iran to the Deccan: Architectural Transmission and the Madrasa of Mahmud Gavan at Bidar,” in *Iran and the Deccan: Persianate Art, Culture, and Talent in Circulation, 1400–1700*, ed. K. Overton, 175–202 (Bloomington: Indiana University Press, 2020); G. Necipoğlu, “Plans and Models in 15th- and 16th-Century Ottoman Architectural Practice,” *Journal of the Society of Architectural Historians* 45, no. 3 (1986): 224–43; M. Hurx, *Architecture as Profession: The Origins of Architectural Practice in the Low Countries in the Fifteenth Century* (Turnhout: Brepols, 2018); A. C. Huppert, “Material Matters: Training the Renaissance Architect,” in *Artistic Practice and Cultural Transfer in Early Modern Italy: Essays in Honour of Deborah Howard*, ed. N. Avcioglu and A. Sherman, 89–106 (Farnham: Ashgate, 2015).

140. J. Hillson, “Villard de Honnecourt and Bar Tracery: Reims Cathedral and Processes of Stylistic Transmission, c. 1210–40,” *Gesta* 69, no. 2 (2020): 169–202.

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