had been married in the early ninth century near Tus in eastern Iran. The site became known as mashhad (martyrium) and was the most venerated Shi'ite shrine in Iran. Over the centuries many subsidiary buildings had been added around the mausoleum, which was embellished with luxurious decorative revetments in carved marble and luster tiles. To accommodate the growing number of pilgrims, Gavharshad added a large congregational mosque and two assembly halls (där al-risāla [house for sayyids] and där al-hujjāj [house for Koran-reciters]). The architect Qasim al-Din Shirazi appended the mosque to the tomb chamber and wedged the two halls into the available space. For the mosque he used the traditional four-ivan plan, but ingeniously placed a dome over, not beyond, the qibla iwan. The iwan opposite led to the assembly halls. He covered the rectangular där al-hujjāj with transverse vaulting, already used at the shrine of Ahmad Yasavi.

Decorating the building also took much time and money. Since the mosque was appended to the shrine, it had no exterior façade and the most lavish work was concentrated around the courtyard. The two-story tilework panels continue uninterruptedly around the corners of the courtyard so that the elevation wraps the space. The mosque's qibla iwan was distinguished by flanking minarets with lozenge decoration and a broad inscription band in tile mosaic, personally designed by Gavharshad's son Baysanghur, a renowned calligrapher and the leading bibliophile of the day (see Chapter 3). The huge tile mosaic mihrab at the rear of the qibla iwan stands under a semidome of cascading muqarnas elements. The overall effect has stunned pilgrims for centuries. 75

Between 1417 and 1421, Shahrukh's son Ulughbeg built a royal madrasa and khanqah facing the Registan, the town square of Samarkand [57, 58]. Nothing is known about the khanqah, since the site is now occupied by the seventeenth-century Shirdar madrasa [261]. Ulughbeg's madrasa, however, is the largest and most complex of all Timurid examples, measuring fifty-six by eighty-one meters. Minarets stand at each of the four corners, and an imposing façade faces the square. The thirty-five-meter-high central puqâq may once have been flanked by tall double domes, but only low cupolas remain. The thirty-meter-square court has iwans in the middle of each side and fifty rooms which once housed one hundred students. A broad shallow mosque stands along the rear wall between cruciform domed chambers. All exterior surfaces were covered: marble dados were surmounted by frames recessed in brick mosaic, tile mosaic, and cuerda seca tiles. In monumentality and scale, Ulughbeg deliberately emulated such works of his grandfathers Timur as the Mosque of Bibi Khanum, but as a seat of learning, the madrasa reflected the governor's personal interest in science. It attracted some of the greatest minds of the age, who designed the observatory that Ulughbeg built on the northern outskirts of the city. Excavations have uncovered three colonial astronomical instruments: a sextant, a solar clock, and a quadrant sector.

At the same time Gavharshad ordered work begun on a large complex in Herat. 76 She used the same architect she had hired to work at Mashhad, Qasim al-Din Shirazi. He took two decades (1417–28) to complete the work, probably because he was repeatedly interrupted by other commissions. The complex included a large rectangular congregational mosque and a madrasa with a dynastic mausoleum [59], but only two minarets and the tomb, covered with the typical Timurid high double dome, survive. Time and earthquakes have taken their toll, but the worst damage was inflicted in 1885, when the complex was mined at British insistence lest
it harbor enemy Russians. The fragmentary remains show
the high level of Gawharshad's taste and resources, for the
complex was at the forefront of architectural innovation
in the early fifteenth century. The minarets were clad
in brilliant tile mosaic with intricate geometric patterns and
inscriptions, but the interior vaulting of the tomb [60] is
where Qasim al-Din's genius is best displayed. Whereas
the Gur-i Min had a relatively simple hemispherical dome
covering the interior of the tomb, the mausoleum in Herat
uses an elaborate system of squinch-net vaulting which inte-
grates the interior space into a unified vertical composition.

Squinch-net vaulting is the most important innovation in
Timurid architecture and seems to develop from earlier
experiments with transverse vaulting over rectangular spaces.
Here, the traditional square room (9.5 meters to a side) is
expanded into a cruciform chamber with broad niches on
all sides. Four broad arches span the recesses; four other
arches spring simultaneously across the central square. Their
intersection creates a smaller square which supports
the traditional arrangement of four squinches, an octagon,
a sixteen-sided zone, and the dome. The interstices between
the ribs and squinches are filled with faceted and painted
plaster, hence the name "squinch ret." The advantages
of this system are manifold: the vault itself is significantly
smaller than the square room it covers; it is relatively light in
weight; the loads are concentrated on points rather than
walls, as in Gothic architecture, allowing the walls to be
opened up with windows or filled with staircases and
subsidary rooms.

This new trend of opening up the interior space through
the dissolution of walls and piers is also found at the shrine
Shahri-khund at the grave of the Sufi shaykh 'Abdallah
Ansari at Gazargah (1425–72), a few kilometers north-east of
Herat. This may have been one of the projects that drew
Qasim al-Din away from his work for Gawharshad. The
shrine consists of a large rectangular courtyard with an iwan
in the middle of each of its sides. The largest is on the qibla,
or western, side of the complex, and overlooks the sultans'grave [61]. The entrance stands opposite and is flanked by
large rectangular rooms covered with transverse vaulting and
small rooms covered with squinch nets. This plan has been
called a "bazaar" or funerary enclosure, and may have been
chosen as a compromise between the traditional Muslim
restraint to cover the grave and the patron's desire to
monumentalize a sacred spot. The culmination of these new types of vaults in early
Timurid architecture is found at the Ghiahiyya madrasa at
Khargird, Qasim al-Din's last work, finished by Ghiahiy al-
Din Shirazi in 1443–4. It was built for the vizier Pir Ahmad
Khwaf, who came from Khwaf, a once flourishing town in a
now desolate region on the Iranian-Afghan border. The
building uses a standard plan [62] like that of Gazargah,
with an entrance complex leading to a courtyard with four
iwalks. Here, however, the distribution of space is far more
complex and sophisticated: the courtyard [63], for example,
is square. Its corners are beveled to unify the four façades,
taking the experiment of the Mausoleum mosque one step
further. Its four iwalks are equal in size, the result of moving
the mosque to the entrance complex. The elaboration of the
everything complex as an architectural unit is a hallmark
of Timurid architecture and a feature that attracted the
attention of architects in later periods. The rooms that flank
the entrance are cruciform, one covered with spectacular
squinch-net vaulting, as in the tomb of Gawharshad. The
one to the right, which has a mihrab, has been identified
as a mosque; the other [64] is believed to have been an

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59. Herat, Complex of Gawharshad, 1317–8, plan of ensemble and detail of tomb.

60. Herat, Complex of Gawharshad, tomb.

61. Gazargah, 1425–72, Shrine of 'Abdallah Ansari, view of iwan.
assembly hall. Instead of the shallow dome found at Herat, it has an octagonal lantern that allows light to suffuse the chamber and to lead the eye along the arches from the dome to the ground. Today, the building lacks the height typical of earlier Timurid monuments, since the original exterior treatment of the assembly hall dome is unknown, but its horizontal mass is emphasized by the decoration of the side walls with monumental inscriptions in brick mosaic. The brilliant colors of the tilework (blue, turquoise, black, and white) contrast sharply against the dun-colored plain. The foundation inscription on the portal gives the date 1444-5, suggesting that it took several years to complete the elaborate tile decoration.

Timurid prosperity extended to central Iran, and many towns in the hinterland of Isfahan and Yazd were embellished with restored and new buildings. Some twenty buildings have survived in the region of Yazd alone, and dozens more are attested in the sources. The largest was the complex (1437) founded by Shahnāb’s governor Mir Chaqmaq and his wife; it included a four-iwan mosque, khanqah, qanat, cistern, and well, supported by a nearby bath and caravansarai. A regional style of architecture emerged which was related to but distinct from the metropolitan style of northeastern Iran. In contrast to the light and airy quality of the finest metropolitan buildings, these provincial examples are heavier and more vaulted with intersecting arches. Walls are usually whitewashed; decoration is confined to tiled dadoes and minbars [65].

64. Khargird, Ghiyathiyia Madrasa, interior vault

65. Khargird, Ghiyathiyia Madrasa, courtyard
After Shahbuz’s death in 1447, his son Ughbehg took over the realm, but within two years he was murdered by his own son. His nephew Abu Sa’id (r. 1461–59) managed to overcome depredations by rivals on the east and west and reunited Transoxiana, present-day Afghanistan, and southern Iran. The most famous building from his reign is the building erected by his wife (ca. 1469) known as Isfah Khana, a burial place for women and children of the Timurid family. Its complex vaulting continues the imperial Timurid style seen at Gawharshad’s mausoleum and the madrasa at Khargird. 128

The most remarkable patron of the age, however, was Husayn Bayqara (r. 1470–1506) who ruled Khurasan from Herat, where the final flowering of Timurid culture took place. Stars in his constellation included the poet ‘Abd al-Rahman Jami (1414–92), the painter Bihzad (see Chapter 5), and the polymath ‘Alishir Nava’i (1434–1510), himself another famous patron. Among Husayn Bayqara’s numerous restorations and foundations in Herat and its environs was the madrasa he built ca. 1492–3. Only four minarets, towering some fifty-five meters above the ruins, remain, but the shafts, decorated with spectacular tile mosaic panels in seven colors (light and dark blue, white, buff, yellow, and green), are more elaborate than the two remaining from Gawharshad’s complex nearby. In the debris at the base of the minarets, a black tombstone [66] inscribed with the name of Mansur, Husayn Bayqara’s father, was found. Exquisite allower carving with vegetal arabesques on several levels, punctuated with peony and lotus blossoms, gives this tombstone a sense of liveliness and movement. It and a related group of tombstones represent the finest Timurid stone-carving and show that stone-carvers were well aware of contemporary innovations in manuscript illumination, carpets, and woodwork (see Chapter 5). 129 The works of Husayn Bayqara’s companion and confidant, ‘Alishir Nava’i, were as important as those of the ruler. The historian Khuwândamîr counted fifty-two caravanserais, twenty mosques, nineteen cisterns, fourteen bridges, ten khanaqâhs and related buildings, nine baths, five soup kitchens, four madrasas, one hospital, and one room for readers of the Koran. Some of these were only repairs to existing buildings, but at least two were major projects in Herat: the foundation of the Ikhlasiyâh, a charitable complex (1475), and a complete restoration of the congregational mosque (1498–1500). Nothing remains of the Ikhlasiyâh, which may have stood opposite the sultan’s madrasa on the east side of Khâybarh, the main street north of the city. It included a congregational mosque, a madrasa, a khanaqâh, a hospital, a Koran-readers’ room, and a bath, and the magnitude of the work was undoubtedly inspired by the growth of the foundation of the Maud-i Shah in Mashhad, which was built in 1451 by Ahmad b. Shams al-Dîn Muhammad, “the builder from Tabriz.” Some scholars have also noted the similarities between the Blue Mosque and the Yezd or Green Mosque in Bursa [181], whose tile decoration is signed by workmen from Tabriz. It has been suggested that the builder of the Maud-i Shah in Mashhad also designed the Blue Mosque in Tabriz and was familiar with the Green Mosque at Bursa, but a simpler and more likely explanation is that all these buildings were modeled on the early-fourteenth-century Rashidiya complex that once stood outside Tabriz, one of the greatest multi-functional complexes of its day. 130 The Blue Mosque may have been designed to serve a commemorative function as Jahan-shah’s tomb, but no burial has been found; it may have been designed as a mosque, since an inscription around the iwan screen contains Koranic verses (9:18–19) referring to mosques. 131 The inscription ends with the date (9 Rabi’ I 872/26 October 1463) and the signature of Nîmat Allah b. Muhammad al-Bawwâb (“the Doorkeeper”), whose role in the work is yet to be determined.

The exterior and interior surfaces of the Blue Mosque are ruined, but they still display an unusual variety of tile decoration of superb quality [68]. Tile mosaic in six colors covers the exterior and much of the interior walls, above a marble dado carved with an elegant inscription against a vegetal scroll. Particularly striking are the floral arabesque motifs and the inscriptions, often set out in white or gold
against a deep blue or green ground. The upper surfaces and vaults of the main chamber were covered with hexagonal dark-blue glazed tiles, while those of the sanctuary were purple overpainted in gold. At the base of the cable molding on the entrance portal, later tiles were used in one of the very rare instances of this technique in fifteenth-century architecture. Highly embossed molded fragments of underglaze-painted tile remain on the corner buttresses.

Other buildings in Tabriz were even more splendid than the Muzaffariya, according to contemporary accounts. The Naqsh-i Jahan complex, begun by the Aqqoyunlu Uzun Hasan (r. 1435-58) and enlarged by his son Ya'qub (r. 1478–90), comprised a mosque, a madrasa in which the patron was buried, a kitchen serving meals to the poor, and a bazaar. Ya'qub’s palace, known as the Hasht Bihisht (“Eighth Paradises”), is known only from the description of a Venetian merchant who saw it in 1507. He described the palace as having four corner rooms, four antechambers before the entrances, a dome, and upper rooms. These elements correspond to a type of building described in Timurid sources and found in many later examples from Istanbul to Agra (see Chapters 15 and 18). The plan of eight rooms surrounding a central domed hall undoubtedly inspired the name. This pavilion was set within a garden and attached to a madrasa, mosque, and hospital.

Turkoman buildings in Isfahan show the same awareness of color seen at the Blue Mosque in Tabriz and ultimately in Timurid buildings in Central Asia. Thirteen years earlier, in 1455–4, Jahanshah, the Qaraqoyunlu patron of the Blue Mosque, had built the Darb-i Imam there. This shrine for two imams has a magnificent tile mosaic portal [70] with symmetrically displayed panels containing arabesques, vases, and inscriptions. Persian verses on the portal and in the vestibule describe the building with mystical images. Uzun Hasan, the Aqqoyunlu ruler who held Isfahan between 1469 and 1477, also embellished the city with superb tile mosaics: he ordered extensive repairs to the south, or qibla, iwan of the congregational mosque [69]. Its revetment displays a variety of mottled, including raised polygons on a strapwork ground and geometric patterns similar to those used earlier at the Darb-i Imam. The hospice built under his son Ya'qub for the Sufi shaykh Abu Mas'ud (1490) has an entrance portal decorated with elaborate tile patterns, including vase panels similar to those on the Darb-i Imam.

The region around Yazd also continued to prosper under Turkoman rule. In 1453, during the reign of Jahan shah, the arch over the portal of the congregational mosque was repaired and its revetment of tile mosaic restored. In the surrounding towns and villages, mosques were built or repaired, most with plans based on the distinctive disposition of the congregational mosque in Yazd. The typical plan comprised a court with low arcade on three sides and a large single iwan and dome chamber flanked by closed prayer halls on the qibla side. The mosque at Bandarabad (1473–4) is a good example and is remarkable for its fine tile mosaic minbar. 49 The Timurid architectural vocabulary penetrated further west. One example is the tomb at Hisarkaya (Hasan Keyf, Turkey) [71], for Zayn al-Mirza, Uzun Hasan’s son killed in battle against the Ottomans in 1473. Prototypes for its cylindrical shape can be found in earlier buildings from Anatolia, but the bulbous dome and decoration in brick and tile mosaic are frankly Timurid in style and technique. Another example is the Çini Kiosk (“Tiled Pavilion”) built in 1472 by the Ottoman sultan Mehmed II (r. 1444–81, with interruption) in the Topkapi Palace in Istanbul [72]. The centralized and symmetrical plan, squinch-net vaulting, and tile decoration are standard elements in the Timurid architectural vocabulary, but again, it is much more likely that the immediate source was now vanished Turkoman buildings in western Iran and eastern Anatolia, also the model for Ya’qub’s Hasht Bihisht palace in Tabriz.

The importance of Timurid architecture lies not only in the magnificent buildings in Central Asia, but also in the