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BANNĀʾĪ

BANNĀʾĪ (construction). Though the subject of monumental architecture in Iran has been the focus of a number of studies and analyses (see, for example, architecture), popular building crafts have received considerably less scholarly attention. The treatment of "domestic architecture," which is accorded a mere ten pages in *A Survey of Persian Art* (III, pp. 900-12), is indicative of the indifference endemic among orientalists and art historians to anonymous buildings. On the subject there are but a few monographs and studies on regional building crafts and even fewer works on construction in the area as a whole (see Wulff, *Crafts*, pp. 102-35). While the term *bannāʾī* covers the entire construction field, in this brief study domestic building techniques, in particular, which are more or less part of the traditional crafts, and the recent evolution of popular housing will be emphasized. Monumental architecture, the organization of interior spaces, and portable housing such as tents, huts, etc., which form the subjects of separate entries, will not be discussed.

The word *bannāʾī*, used to refer to the construction of buildings, is derived from *bannāʾ* "mason"; however, because of the rarity of wood on the Persian plateau, construction materials are almost exclusively of mineral origin (stone, gypsum, and especially mud), and the master builder (*meʿmārbāšī*, *ostād*) is the mason. Only in the Caspian provinces, which enjoy abundant supplies of wood, does the carpenter (*najjār*) play a predominant role in construction (Bromberger, 1986, p. 79). As for the rest of the country, it is in the use of inorganic materials (like bricks) that traditional Iranian architecture has made

its most important contributions to the arts of building: construction of barrel vaults (*ṭāq-e żarbī*) without centering and of corbeled brick domes (*gonbad*; Creswell, pp. 245, 321; Beazley and Harverson, pp. 23-26; Wulff, pp. 102-05).

Principal traditional construction methods. Though in the country as a whole and especially between the Caspian sea and the Iranian plateau, these are quite varied, it is possible to extrapolate several predominant architectural formulas, ranging from foundations to roofing systems.

The first operation consists of marking out the future building by tracing the lines of the walls with powdered lime (*āhak*) or gypsum (*gač*); for an ordinary structure the form and area are agreed upon between the mason and the client, without the need for plans. The foundations (*pey*) are laid in trenches (*šālūda*) measuring 20 to 100 cm deep and consist of layers of stone rubble alternating with layers of a mixture of mud, water, and burnt lime (*šefta*). The only exceptions to this formula are types of underground dwellings called *lu* in the Kavīr or caves (see, e.g., Gabriel, p. 175; Wulff, pp. 102-03)—or houses in specific regions, like the elevated structures of the Caspian provinces, which are raised on stilts to protect them from the damp soil (see Bromberger, 1986, pp. 60-64; Bazin and Bromberger, p. 42 and map 21).

For the construction of walls (*dīvār*, in dialects also *tīfāl*) different materials are used, depending upon the region and the purpose of the building.

1. *Kāh-gel* is a mixture of levigated earth, water, and chopped straw, which is vigorously kneaded with the bare feet, then formed into chunks, which are arranged in courses (*mohra*) about 50 cm high. When one course is finished, the builder levels it with a trowel (*māla*), then allows it to dry for two or three days before resuming work: “Otherwise the wall will collapse under its own weight” (Beazley and Harverson, p. 17). These mud walls generally have a slight batter and, for protection from the rain, are capped with baked bricks or thorny brushwood “weighed down with a course of a mixture of loam and lime that sets and becomes water resistant” (Wulff, p. 109). Chunks of *kāh-gel* are used especially in the construction of walls surrounding orchards, courtyards, and even icehouses.

2. Unbaked bricks (*ḵešt*) shaped in wooden molds (*qāleb*) are the most common material used in the construction of the walls of traditional peasant houses. These bricks generally measure 20-25 cm square by 48 cm thick and are laid with mud mortar (*melāṭ*). The surface of the wall is usually coated with a fine

mixture of clay and wheat chaff (*gel-e pīl*), applied with a trowel, which gives it a smooth and regular appearance. Exterior walls, which support the roof and also serve an insulating function, are very thick (60-90 cm), whereas interior walls are often built of only single thickness of brick.

3. Baked brick (*ājor*) is a material traditionally reserved for important buildings (notables' houses, caravansaries, mosques, and so on) but the use of which has become considerably more popular in the last three decades. The mortar used with these bricks is a mixture of slaked lime and sand (*šen-āhak*), to which in modern construction procedures cement is added. For structures that will be in contact with water, like reservoirs (*āb-anbār*) or the central basins in domestic courtyards, a particularly resistant mortar (*sārūj*) composed of sand, lime, ashes, husks and straw, or goat hair (Wulff, p. 113) is necessary.

4. Stone (*sang*) is used for footings and foundations, rarely for construction of walls except in certain provinces like Fārs or in well-defined types of buildings (e.g. mountain caravansaries; see Siroux, pp. 35-43). This material, which was more commonly used for construction in ancient Iran, was progressively displaced by baked brick, particularly after the 7th/13th century (*Survey of Persian Art* III, p. 899).

5. Wood (*čūb*) forms the skeletons of walls only in the Caspian provinces. A *dīvār-e čūbī* consists either of stacked logs (*verjīn*) or of timber frames constructed from poles (*zigəl*). The interstices are filled with mud tempered with rice straw (*kuləš-ə-gəl*); the structure of the wall, whether of logs or poles, is then coated with plaster. Only in the mountain chalets of Alborz herdsmen are the logs or poles of the skeletons allowed to show (Bromberger, 1986, pp. 66-67; Bromberger, 1974, 41-45; Bazin, I, 165).

The other essential phase of the construction process is completion of the roof, of which four principal types can be enumerated.

1. The flat roof (*bām*, *pošt-e bām*, *rūbūn*) is the most common type, particularly in the piedmont areas (the dry slopes of the Alborz and the Zagros). It is constructed of large joists (*tīr*), which rest on the main walls; boards (*pardū*, *dastak*) are laid on (and sometimes nailed to) these joists and are then covered with cane matting (*ḥaṣīr*), reeds, or even a thick layer of brush. Next several thin layers of mud (*kāh-gel*) are applied and compacted by means of a stone roller (*ḡaltabān*). This type of roof, which provides the inhabitants with

excellent insulation, requires periodic maintenance and repairs. Each year a 2-3 centimeter layer of *kāh-gel* must be added, and after each rainfall the stone roller must be used or the main fissures and cracks repaired.

2. The barrel vault (*ṭāq-e żarbī*) is used to roof rectangular buildings in areas where wood is rare, notably in central Iran. A remarkable feature is that these vaults are constructed without the aid of centering. Most often the unbaked bricks are laid up obliquely in successive laminae through the length of the building and leaning against a vertical wall at the back (Christensen, pp. 100-101; Desmet and Fontaine). The vault may also include a semidome at one end or may be built from each end and finished in the middle with courses of bricks laid perpendicular to the preceding ones. These bricks are very carefully mortared with a mixture of mud and lime.

3. The dome (*gonbad*), either spherical or conical, is used in the same regions for roofing buildings on a square plan. Squinches, i.e., vertical arches constructed at the upper corners of the building, ensure the transition between the square plan of the base and the circular plan of the dome (see photographs and drawing in Beazley and Harverson, p. 25; Wulff, p. 105; for the origin of this technique in the Iranian world, see Godard, pp. 209-10). The bricks are most often laid and mortared in corbeled courses, that is, each course projecting beyond the preceding one, from the bottom to the apex of the dome.

The barrel vault and dome are plastered with mud on the interior as well as on the exterior, so that their structures are rarely visible; such a roof is sometimes even completely hidden from view on the exterior by a second, flat roof constructed above it as protection against deterioration caused by rain and snow and as a useful space for sleeping during the summer.

4. The sloping roof constructed on a wood frame is characteristic of the architecture of the Caspian provinces (Bromberger, pp. 68-79) but is also known sporadically in other regions of the country, especially mountainous ones: for example, Kurdistan (Christensen, pp. 126-27). The simplest form is the gabled roof with two symmetrical inclines. The hipped roof is the most common type in the Caspian region, corresponding to a rectangular building plan, the characteristic module of vernacular architecture. The roof with four equal sides covers buildings on a square plan. Roofing materials offer a certain variety: rice straw (*kuləš*) in the Caspian provinces; cane (*gālī*), wooden planks (*taḵta*), or shingles (*lata*) on the piedmont and the Alborz heights; and tiles

(*sofāl*) fastened on their convex faces to the battens in northwest Gīlān province.

Recent developments. In most rural regions of Iran the sequence of construction operations has changed profoundly during the last thirty years; traditionally materials were manufactured and prepared in situ, whereas today they are purchased in industrial production centers that are sometimes quite distant. Baked bricks and cement have become the predominant construction materials, almost completely displacing unbaked mud. The growth of cement production, in response to strong demand in both urban and rural markets, has been particularly spectacular: 54,000 tons in 1950, 668,000 tons in 1962-63, and 3.7 million tons in 1973 (Issawi, pp. 381-82; *Iran Almanac* 1972, pp. 330-31). In 1971-72 the number of bricks manufactured annually at Tehran was estimated at 2.43 billion, that is, 6 million a day, supplying not only the market in the capital but also the northern and southern regions of the country (*Iran Almanac* 1972, p. 331). In some instances these technical changes have brought with them a complete modification in the building trades: In the Gīlān plain, for example, the cement-block layer (*bulok*; from French bloc) has replaced the carpenter, who was the traditional builder, and the layer of galvanized iron (*ḥalabsāz*) has replaced the thatcher (*gālīsāz*) as the roofer.

At the same time these rapid technical changes, combined with the overall development of society, have shattered the customary framework for the organization of work and the transmission of skills. Traditionally a mason began his career as an apprentice (*šāgerd*) to a master craftsman (*ostād*). In the city such master craftsmen generally belonged to a guild (*ṣenf*), which fulfilled several functions: mutual assistance and support, collection of taxes to be paid to the government, transmission of skills, candidacy examinations for apprentices seeking to become masters (for the seventeenth and eighteenth centuries, see Keyvani, pp. 141-49; for the early nineteenth century, see Kuznetsova, pp. 285-92). The masons' guilds were well represented in Iranian cities. To cite one example, that of Erevan at the beginning of the nineteenth century consisted of twenty-five masters, employing seventy apprentices and eighteen journeymen (*kārgar*) paid by the day; in number of members it ranked fourth among the eleven guilds listed (Kuznetsova, p. 289), which is still a long way, however, from the 12,000 architects (*meʿmār*) and builders (*bannā'*) supposed to have been active at Isfahan in the Safavid period (Keyvani, p. 56).

In rural areas traditional construction linked the mason, assisted by several helpers (*šāgerd, kārgar*), on one hand, and the family and friends of the client, on the other. These last took care of the less specialized work, such as transport and preparation of certain materials, leveling the ground before construction, digging the foundation trenches, and so on, whereas the mason performed the more skilled tasks, such as raising the walls and constructing the vaults.

In fact, the development of construction since the 1950s is a good indicator of the changes that have affected Iranian society during the last three decades: the demographic explosion and swelling of the urban population, westernization of technology, and disappearance of traditional skills. In 1940 the number of workers in the urban construction sector was estimated at 60,000 (Floor, p. 28); in 1966 this number was four times greater for Iran as a whole. The building trades thus represented 5.7 percent of the total work force; in 1976, during a "building boom," this percentage had more than doubled (to 13.5 percent, that is, 1.2 million people, usually employed by small businesses, out of a total work force of 8.8. million). The majority of these new masons, often immigrants from rural areas, have no specific training, nor have they the competence that was formerly acquired through apprenticeship or family tradition. That is one of the reasons for the mediocre quality of recent constructions. More basically, the construction crisis was one of the most acute symptoms of the larger pre-revolutionary crisis: insufficient housing, real-estate speculation, doubling of the average price per square meter at Tehran between 1974 and 1977. The collapse of the Pahlavi state has led to a spectacular increase in private construction, carried on without licensing: The number of buildings completed at Tehran thus tripled in three years (Hourcade and Khosrokhavar, pp. 62-83). In 1982 steps were taken to limit high-rise construction in Tehran, with the aim of preventing erection of buildings more than three stories tall. These measures, combined with the economic crisis, poverty, and the high cost of construction materials, have brought a recession to this key sector of the country's economy.

BIBLIOGRAPHY

A. A. Bakhtiar and R. Hillenbrand, "Domestic Architecture in Nineteenth Century Iran: the Manzil-i Sartîp Sidihî Near Isfahan," in E. Bosworth and C. Hillenbrand, eds., *Qajar Iran: Political, Social and Cultural Change 1800-1925*, Edinburgh, 1983, pp. 383-93.

M. Bazin, *Le Tâlech: Une région ethnique au nord de l'Iran*, Paris, 1980.

M. Bazin and C. Bromberger, *Gilân et Azarbâyjân oriental. Cartes et documents ethnographiques*, Paris, 1982.

E. Beazley and M. Harverson, *Living with the Desert: Working Buildings of the Iranian Plateau*, Warminster, 1982.

C. Bromberger, *Habitat, architecture et société rurale dans la plaine du Gilân*, Paris, 1986.

Idem, "Habitations du Gilân," *Objets et mondes* 14/1, 1974, pp. 3-56.

N. Christensen, "Haustypen und Gehöftbildung in Westpersien," *Anthropos* 62/1-2, 1967, pp. 89-138.

K. A. C. Creswell, *A Short Account of Early Muslim Architecture*, London, 1958.

H. Desmet and P. Fontaine, *La région d'Arāk et de Hamadān. Cartes et documents ethnographiques*, Paris (forthcoming).

W. Floor, *Industrialization in Iran, 1900-1941*, Durham, 1984.

A. Gabriel, *Durch Persiens Wüsten*, Stuttgart, 1935.

A. Godard, *L'art de l'Iran*, Paris, 1962. *Iran Almanac 1972*, Tehran, 1972.

B. Hourcade and F. Khosrokhavar, "L'Habitat révolutionnaire à Téhéran, 1977-1981," *Herodote* 31, 1981, pp. 61-83.

C. Issawi, ed., *The Economic History of Iran 1800-1914*, Chicago, 1971.

M. Keyvani, *Artisans and Guild Life in the Later Safavid Period: Contributions to the Social-Economic History of Persia*, Berlin, 1982.

N. A. Kuznetsova, “Guild Organization. Early Nineteenth Century,” in Issawi, 1971, pp. 285-92.

G. Petherbridge, “The House and Society,” in *The Architecture of the Islamic World*, ed. G. Michell, New York, 1978, pp. 193-208.

F. Raḥīmī Lārījānī, “Sāḵtemānhā-ye azajī dar tārīḵ-e meʿmārī-e Īrān,” *Āyanda*, 1361 Š./1982, nos. 3-4, pp. 168-75, 5, pp. 317-26.

R. Rainer, *Traditional Building in Iran*, Graz, 1977.

W. Simpson, “Mud Architecture: Notes Made in Persia and Other Countries,” *Transactions of the Royal Institute of British Architecture*, N.S. 3, 1887, pp. 570-80.

M. Siroux, *Caravansérails et petites constructions routières en Iran*, Cairo, 1949.

G. Zander, “Observations sur l’architecture civile d’Ispahan,” *Iranian Studies* 7/1-2, 1974, pp. 294-319.

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