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Physical features and analysis of traditional mosques: the case of Quzzat quarter of Herat Old City, Afghanistan

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Abstract

This study examines the physical features of traditional mosques in the Quzzat (Bardrani) quarter of Herat Old City, Afghanistan. Traditional mosques are constructed with locally available materials and are planned based on cultural and climatic conditions. Mosques are categorised as modern or traditional. Traditional mosques are divided into three subcategories: preserved, damaged (defaced), and transformed. Transformed mosques are formerly traditional mosques reconstructed with modern or industrial materials (concrete and reinforcement). This study explores the distribution of mosques and analyses their plan typology. Mosques are categorised into five plan types, and three relative case studies are described in detail to provide a better understanding and an in-depth analysis of mosque typology.

Keywords Physical features, Spatial and architectural analyses, Traditional mosques, Built heritage conservation, Herat Old City, Afghanistan

1 Introduction

1.1 General background

Herat is the only Timurid town that retains the features of a medieval town and stands on its original site^{1, 2} (Najimi 1988). In addition to walls and fortifications, the town is an example of common Islamic architecture, landscape, and urbanisation (Gammell 2016; UNESCO 2004; Heravi 2005; Najimi 1988). Herat was known as the most important city in the early Islamic period due to its size, beauty, populace, prosperity, and abundance of gardens, as well as its eminent citizens, which made Herat both the key to

Asia and the heart of Khurasan (Maqdisi 1982; Astakhri 2007; Heravi 2005; Habibi 1985; Raheeq 1984; Ibn-Resta 1892; Abru 1970; Hamawi 2006; Asfazari 1960; Al-Heravi 1943).

A Masjid (hereafter mosque) serves as a place of worship and prayer for Muslims, a place to perform rituals, lectures and studies, recitation, learning the Qur'an, celebration of religious ceremonies, and discussions about religion and politics. Mosques were integral to the development of state and military strategy during the Prophet Muhammad's time (Adi and Puspitasari 2016; Abul-Qaraya B 2015). In Herat Old City, mosques operate in the same manner as in newer cities with stronger community ties due to the influence of urban patterns and strong social ties that are more traditional. In addition to hosting general functions, mosques in the Old City accommodate overnight guests and remain unlocked during daytime hours, where guests may gather for meals.

While mosques are primary social facilities, and symbols of Islamic architecture, with many studies

¹ See UNESCO website page <https://en.unesco.org/silkroad/content/herat>.

² See ARCHNET website page <https://www.archnet.org/sites/6409>.

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conducted on them worldwide, limited studies have been done in Herat. Niedermeyer (1924), Najimi (1988), Rajayee (1984), and Gammell (2016) located mosques without plan descriptions and features on maps of the Old City. AKTC published a book in 2017, 'Preserving Historic Heritage in Afghanistan', which detailed the history, preservation, and restoration processes, with drawings and illustrations of four mosques and one synagogue called Yu Aw (Jodidio 2017). Rajayee plotted 88 mosques in the Old City, 22 of which were in the Quzzat (also known as Bardrani) quarter. Rajayee provided details on only eight mosques in the Old City, two of which were in the Quzzat quarter. In 1988, Najimi located 83 mosques on the map of the Old City and plotted 24 mosques in the Quzzat quarter. He did not expound on the planning features and typological analysis of the mosques (Najimi 1988). Asim Shimizu, (2022b) conducted a comprehensive typological analysis of the mosques, finding 29, and studied a period of development of the mosques. Another study focusing on the material transformation of mosques failed to consider the details of mosques and factors such as their location, shape, number of floors, site direction, and function (Asim and Shimizu 2022a).

Globally, numerous studies have been conducted on the architecture and typology of mosques in Asian countries, but limited studies on the typology of traditional mosques considering several factors, particularly brick-built structures, have occurred. Based on mosque layouts, Mustafa (2013) classified architectural styles into six categories but did not discuss the shape and features of the plans and storey/floor levels of mosques. Ahmad analysed typological plans and main structures for mosques but did not specify when and in what forms the mosques were created (Ahmad, Zin, and Arbi 2013). Budi (2004) examined Javanese mosques typologically based on their plans and structures, which differ from those in Herat, Afghanistan. Hillenbrand (1982) has also studied traditional brick-built structures, such as the Sugas Mosque and Seljuq dome chambers in Iran, but he has not examined them collectively based on plan shapes, route types, and storey analyses (Hillenbrand 1982). In Algeria, Redjem pointed out that courtyards and galleries are crucial to the efficiency of mosques in regard to their operation through the morphological analysis of mosques (Redjem and Mazouz 2022).

Although many researchers state that the mosques of Herat are special, with artistic values, ornaments, and their functions explained, they have not fully explored the physical features. Although Jodidio briefly wrote about the historical backgrounds, types of domes and material, and courtyard structural components, he neither categorised nor included all mosques (Jodidio 2017).

Based on numerous studies worldwide, mosques are analysed according to their structure, style, type, and plans. In contrast, the shape of the plan, its physical and component properties, and the level of the storey are not examined, nor are the physical features properly identified.

A few mosques are reported in books and papers with spatial analysis, drawings with limited descriptions, historical background, artistic features, illustrations, and figures in Herat. However, these are not organised by detailed shape analysis, groups, spatial configuration, composition, or types. Therefore, we decided to analyse all traditional mosques within the study area based on their shape and physical characteristics.

Several studies have been conducted on architectural, artistic, social, and material transformation, management, and preservation aspects of traditional architecture, but no specific research has been published on the architectural characteristics of traditional mosques, particularly mosques demonstrating heritage values (Asim and Shimizu 2022a; Asim and Shimizu 2022b; Redjem 2022; Azizi-Bondarabadi and Haji Sadeghi 2022; Carlos et al. 2022; Correia and Duarte Carlos 2021; Moriset, Rakotomamonjy, and Gandreau 2021).

Thus, it would be valuable to analyse the site plan features of mosques and determine their types and characteristics, the shape of their site plans, and the placement of the mosque components in the Old City of Herat.

1.2 Preservative and legislative measurements

Laws, including constitutions, statutory laws, traditional laws, treaties, and administrative regulations, serve as critical means for protecting cultural heritage (Reap 2022). Reap explains that heritage legislation in different countries has resulted in the protection of cultural heritage worldwide, not including Afghanistan, the case in this study (Reap 2022).

Since the establishment of the UNESCO office in Kabul in 1948, studies have been conducted and regulations have been approved to safeguard monuments (UNESCO 2004, 2010, 2021; Asim and Shimizu 2022a; Asim and Shimizu 2022b). An agreement for the conservation of tangible cultural heritage in Herat was drafted in April 2005 (Samimi, Ando, and Kawish 2019). A cultural heritage conservation mission was launched in May 2005 by AKTC, lasting until 2010 (Samimi, Ando, and Kawish 2019, Jodidio 2017). An expert working group meeting was held at the UNESCO World Heritage Centre in Turin, Italy, in September 2012, and the Afghan government was urged to exert pressure to ensure that the historical urban fabric of Herat, as well as the monumental ensembles, were effectively protected.

In May 2004, the Law on the Preservation of the Historical and Cultural Heritage of Afghanistan was

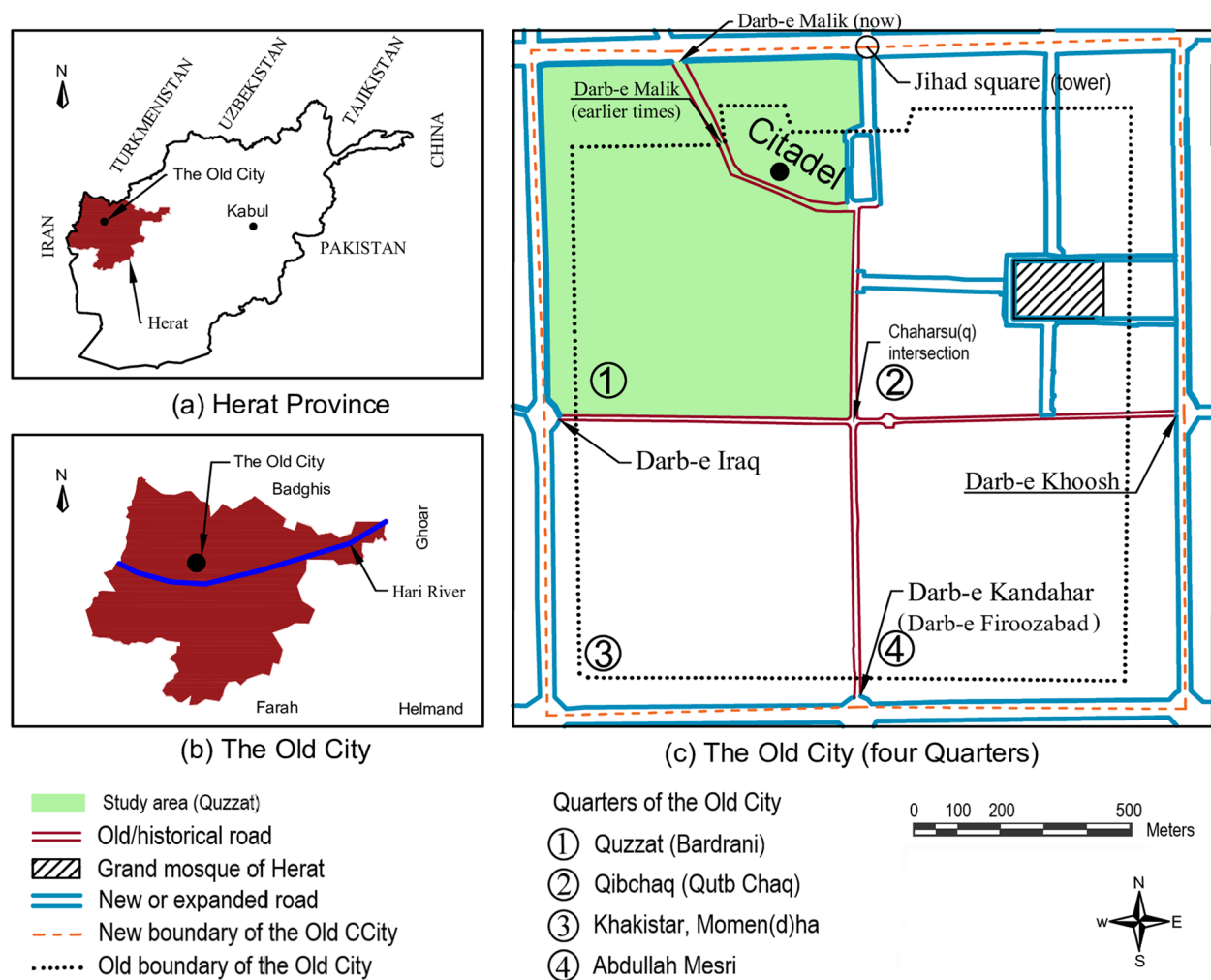


Fig. 1 Study area. 2022. (source: authors)

approved based on the constitutional law of Afghanistan to protect the country's heritage assets (Constitutional law 2004; heritage law 2004). Another law on the Protection of the Cultural and Tangible Heritage of Herat, signed in 2005, prohibits further construction activities in Herat (Rules 2005). These laws and AKTC's technical and financial assistance led to a formal registration, marking, and safeguarding of the traditional mosques and other monuments in the Old City, along with a proposal to put Herat's name on the UNESCO heritage site (MCI 2021; Ashrafi 2021; officials' interviews 2021)³.

Guidelines and rules are in place to protect mosques and traditional buildings in Afghanistan, particularly Herat Old City. Construction or reconstruction of

buildings is prohibited and subject to the following conditions: 1) local materials should be used, 2) the reconstruction should not exceed seven metres in height, and 3) the reconstruction should have a traditional view (heritage law 2004; Rules 2005).

Asim Shimizu 2022a, 2022b reported that 10 out of 26 traditional mosques were transformed from traditional material to modern (mainly concrete) between 2001 and 21 (Asim and Shimizu 2022a, 1832). According to Samimi, newcomers (immigrants) find the Old City attractive, but they do not have strong 'emotional attachments' to the buildings and prefer to reconstruct whenever possible (Samimi, Ando, and Kawish 2019).

According to Asim and Shimizu, three types of transformed mosques can be found in the study area: 1) newly covered, originally a traditional mosque that lost its arch-supported domical vault roof, which is newly

³ <https://thekabultimes.gov.af/herat-city-to-be-listed-as-unesco-world-heritage-site>.

supported with a concrete beam structure and has been modernised primarily with a concrete ceiling; 2) rebuilt with a traditional façade mosque, originally a traditional mosque that is transformed to modern material and has a traditional facade; and 3) rebuilt, originally a traditional mosque that has been reconstructed with modern material (concrete) and without any reference to the previous plan (subtypes B, C1, C2, Type II: transformed; Asim and Shimizu 2022a, 1829).

A total of 13 of 26 mosques with traditional materials have been preserved, 1 out of 26 has been defaced (damaged), and the other 12 have been transformed (Asim and Shimizu 2022a). Changes may have been necessary in some cases but not in others. In some cases, constructing the façade in a traditional form was possible, such as type 2 (rebuilt with a traditional facade), while in others, such as type 3 (rebuilt), restoration to a traditional shape was impossible.

1.3 Study area

Herat is Afghanistan's third-largest city, with a population of 493,600, in western Afghanistan (Loda et al. 2013; Samimi, Ando, and Kawish 2017, 2019). It is an oasis on the Silk Road, situated in a valley surrounded by mountains, at the intersection of Asia, linking India to Iran, Tajikistan, China, etc., and as the capital of the Timurid dynasty (Asim and Ando 2020; Najimi 1988; Noelle-Karimi 2014; Heravi 2005). The city of Herat is located four kilometres from the Hari-rud River, which feeds canals deep into the city and surrounding villages.

The Old City had a boundary wall that existed until the 1930s (for more details and dimensions see Najimi 1988; Asfazari 1960; Ahrari 1931). Two main streets intersect in the Old City, named Chaharsoo (in Persian: four directions), and divide the city into four quarters (Fig. 1, c). Each quarter has many names: Quzzat (Bardarani), Qibchaq (Qutb-e Chaq, Mahalla-e Awwal), Khakistar (Momandha, Momenha), and Abdullah Mesri (Ahrari 1931; Seljuki 1968, 1964; Habibi 1985; Najimi 1988).

The study is focused on the Quzzat (Bardurani) quarter in the Old City, where UNESCO and other international NGOs have supported conservation and preservation projects since the 1970s. The Quzzat quarter has been the site of the largest number of AKTC conservation projects since 2005, according to Jodido (2017). The area retains the largest number of traditional mosques and many cisterns, traditional houses, and the citadel dating from the Achaemenid and Alexander the Great periods within it (Fig. 1, b). Therefore, we selected the Quzzat quarter for our detailed survey in this study Fig. 1.

2 Purpose and methodology

The popularity of visiting built heritage is rising, and heritage houses, streets, and towns have increasingly become tourist destinations (Zhang 2022). Earthen heritage today is under greater threat of extinction, not only due to man-made factors such as urban pressure, globalisation, and climate change but also due to gentrification and inadequate interventions (Correia and Duarte Carlos 2021). Because of the intensive efforts of UNESCO, supervised by the Afghanistan government, many monuments have been restored, preserved, protected, and safeguarded by AKTC, the residents, and other entities in Herat Old City (Jodidio 2017; Asim and Ando 2020; Samimi, Ando, and Kawish 2017).

The study area is home to 29 mosques, of which three are modern (newly constructed with concrete), 13 are traditional, and 13 were traditional and have been converted to modern (concrete), hereafter referred to as 'transformed'. We referred to earlier studies, conducted a field survey in Apr–July 2021, and utilised GIS (Global Positioning System) to detect the mosque site maps.

This research aims to analyse the features and plan types of 1) preserved traditional mosques and 2) traditional mosques just before they were transformed into modern mosques.

To develop a methodology for analysing mosques, we first identified the two intended types of mosques in the study area.

A preserved mosque is one that maintains its original traditional brick design. As the preserved mosques remain in traditional form and are measurable, on-site measurements were obtained, and a field survey was conducted to plot their plans.

Transformed mosques are mosques whose original designs have been lost, and they have suffered partial or full damage (as mentioned in chapter 1.2, Newly Covered, Rebuilt with traditional façade mosque, Rebuilt). According to Carlos, less conscious conservation actions are taken due to a lack of conservation theory and a lack of clarity as to the significance and value of a site (Carlos et al. 2022).

Damaged (defaced) is a traditional mosque in a ruined state with partial damage.

This research is based on site planning and analysis of general features of traditional mosques, which considers various factors, including the number of stories, shapes of plans, geographical location, etc. The study classifies a typology of plan types and explains the functions of each type with their respective usages. This study could assist other scholars in researching traditional brick-made monuments in countries with similar climate conditions, such as Iran, Turkmenistan, Tajikistan, and

Table 1 Determining shape of mosque

Mosque type	Method of detection	No
Preserved	field observation + GIS (only site maps)	13
Changed	field observation + GIS (site maps and plans) + interviews (determining the location of components)	13
Total		26

Afghanistan. Due to the severe damage and transformations of the transformed mosques, the original traditional plan was shifted to a modern plan, and GIS software was utilised to plot the traditional mosque plans just before the change. The detected maps in GIS are confirmed in the on-site field survey and interviews from original residents who hold knowledge of Herat Old city and are over 50 years of age.

A literature review and spatial analysis of the plans and plotting site maps in GIS comprised the first phase of the research conducted at the laboratory level in Japan in 2020–21. An on-site field survey was carried out in April–July 2021, including drawing plans and sections, taking photos of each mosque, collecting data, and matching (checking) the achieved results of the spatial analysis of site maps (laboratory work) to the circumstance in the study area in the second phase of the study. During the field survey, inscriptions were investigated, notes and records were collected, and photos were taken. The traditionally preserved mosques were measured, and their characteristics and components were identified. The plans and site maps of the transformed mosques were detected through GIS imagery in 1992, 2001, and 2004 just before each mosque was transformed from traditional to modern and digitised in AutoCAD Civil 3D. We interviewed original senior residents, five current local leaders and seven ex-local leaders, 13 retired schoolteachers, 16 typical residents, and 18 traditional masons (all interviewees were above 50 years in age) about the usage, background (general characteristics), and architectural features of 26 traditional mosques. Table 1 shows methods of detecting and drawing the shape of mosque buildings, established based on the origins of the mosques: traditional and modern. We redrew and confirmed the plans of preserved and transformed mosques in the field survey, and the general shape of the mosques was categorised. As case studies, three mosques from different typical types were selected from the 26 mosques to illustrate deeper and closer insight into both preserved and transformed mosques.

This paper covers the following physical features analysis: 1) spatial distribution of the mosques in the study area, 2) analyses of the distribution of mosques based on route type or geographical analysis, 3) the floor level of

the buildings in the mosques, 4) detecting and reproducing shapes of the transformed mosques within the site plan of the mosques prior to modernisation and plotting the shape of existing preserved mosques in the study area, and 5) exemplifying the overall analysis by identifying three case studies for further detailed analysis.

3 Physical features of traditional mosques in Herat old city

3.1 Spatial analysis of mosques

We categorised the routes into four types: Kheyaban (equal to highway) in the northern Old City, Jaddah (street, road), *Kuchah* (alley), and Bombast (dead-end alley, Dalan).

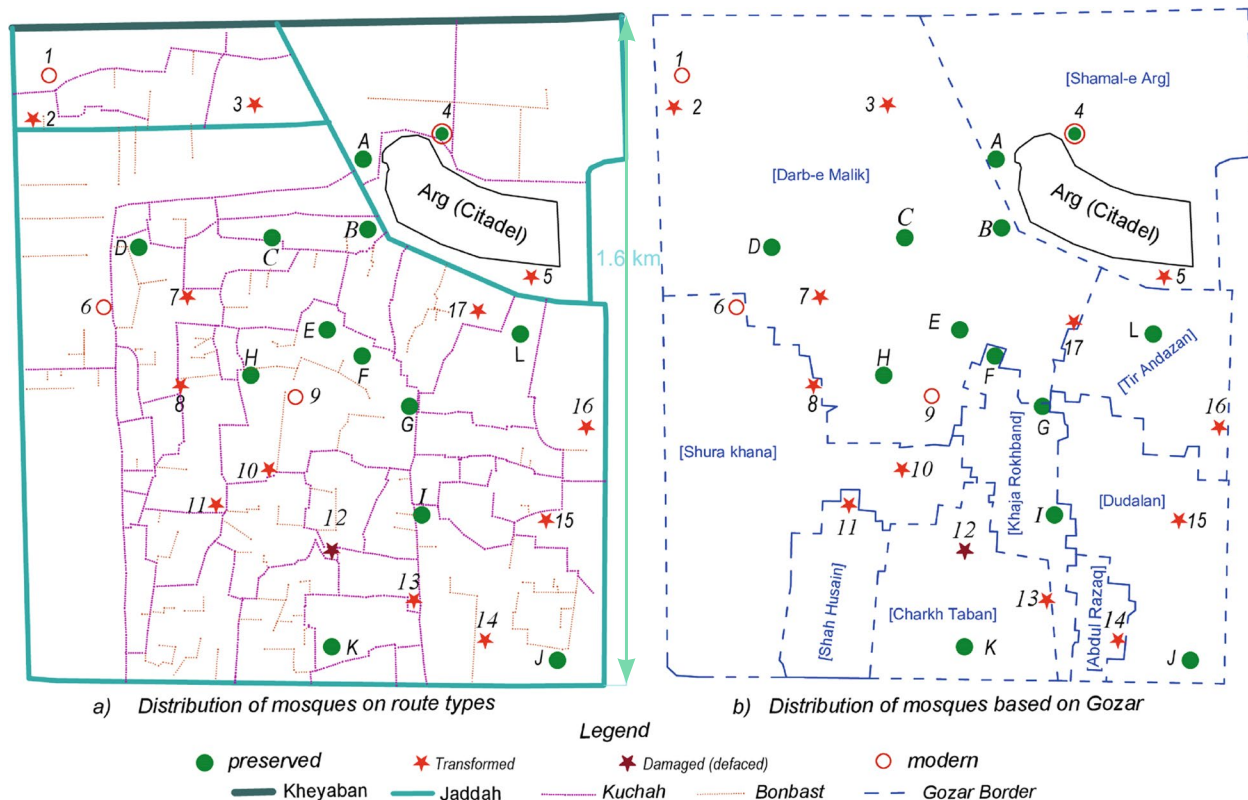
Geographically, traditional mosques are not constructed within the boundary of the Old Town of Kheyaban. Jaddah was home to six traditional mosques, four of which were later transformed, and two are still preserved. The traditional mosques are mostly found in Kuchah, where there are 18 mosques, ten preserved and eight transformed. Bombast originally had two mosques, one of which has been modified, and the other has been preserved. Although Jaddah is the hub for business and needs many mosques, there are more traditional mosques in Kuchah. However, the number of preserved mosques in Kuchah is much higher (10), and the number of preserved mosques in Jaddah is much lower (2). However, the mosques in Jaddah have undergone more changes (66%) than those in Kuchah (44%), which might reflect higher construction as a business area. Compared to other routes, Kuchah and Jaddah have more mosques. Regarding its traditional landscape, the Kuchah route is relatively well preserved, whereas Jaddah is not.

Based on a comparison of traditional mosques by location (route), Kuchah has the highest number of mosques with 18 (Table 2 and Fig. 2).

A Gozar is a territorial division in the Herat Old City for managing traditional community group social functions. It is used for administrative purposes as a basic administrative unit of government even in modern days, the smallest traditional administrative unit established for the performance of governmental functions. The Old City has four quarters (districts) known as Nahia before modern administrative divisions, and the study

Table 2 Distribution of mosques by route

Location of mosque	Traditional			Total
	Preserved	Transformed	Defaced (Damaged)	
Kheyaban (Highway)				0
Jadda (Road)	2	4		6
Koochah (alley)	10	7	1	18
Bonbast (dead-end)	1	1		2
Total	13	12	1	26

**Fig. 2** Distribution of mosques, 2022 (source: the authors)

area (Quzzat, also called Bardrani) is one of them. Each quarter is composed of many Gozars, and Quzzat has 9 Gozars. The larger Gozars are located in the northern parts, and the smaller ones are in the southern regions. In this study, it was found that every Gozar has at least one mosque, and even the smallest Gozar, Abdul Razaq Gozar, has a mosque. Malik Gozar is the largest, with 11 mosques in the north-western part of the study area.

3.2 Features of traditional mosques based on floor/story level

Zeer Zamini, literally underground floor is a basement. A full underground basement is below the ground level for more than 40% of its floor height, while a partially

underground basement is less than 40% below ground level. The Zeer Zamini floors served as prayer areas (depending on weather conditions).

Among the 13 preserved mosques, ten are one-story (floor above ground level) buildings, one is one-story with a partial Zeer Zamini Mosque, one is one-story with a full Zeer Zamini Mosque, and one is a two-story building with a full Zeer Zamini. Among the 12 transformed mosques, two are partial Zeer Zamini, the other 11 were built above ground level without Zeer Zamini, two of which were two-story, and the other eight were one-story. There is only one damaged (defaced), one story, above ground mosque. The mosques with Zeer Zamini (5 cases) are in Kuchah. The maximum story (floor) level

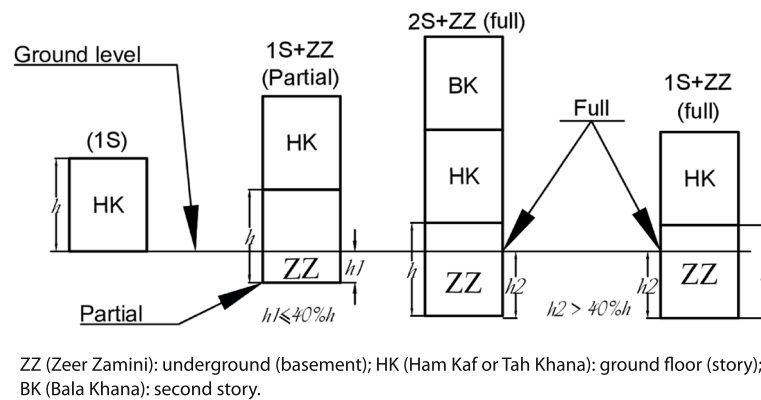


Fig. 3 Story/floor levels of mosque 2022 (source: the authors)

Table 3 Determining the period of development

Type	Preserved			Transformed			Defaced (damaged)	Total
	1S	1S+ZZ	2S+ZZ	1S	1S+ZZ	2S+ZZ		
Above the ground	10			8		2	1	21
Partial Zeer Zamini		1	1		2			4
Full Zeer Zamini		1						1
Total	10	2	1	8	2	2	1	26

in this quarter is no more than two. On the other hand, the number of floor levels for a mosque is no more than three, a Zeer Zamini and a two-story floor (Fig. 3 and Table 3).

3.3 Typological analysis of traditional mosques based on the shape of the plan

We find three kinds of prayer areas in mosques in the study area: Masjid-e *Tabistoni* (summer mosque, hereafter summer building), Masjid-e *Zamistoni* (hereafter winter building) (winter mosque, used in winters and if the mosque has no summer building, the winter mosque is used in summer as well), and Takht or Masjid-e Asr (meaning throne, an open mosque or open prayer area used before/during sunset, and nights, hereafter open prayer area). There are also smaller parts/components of a mosque, which are referred to as equipment in this study and include Hojrah (room) of the *Imam* (leader of the prayer ceremony), *Tullab* (student's) room, *Dast-Sho-I* (toilet), and *Wozukhona* (special space for washing the body).

In a mosque, winter buildings are in the western or northern parts or both. In a winter building, openings such as windows are to the east or south to catch sunlight for heating, while closed walls are in the west and

north, and block any cold heat transfer. The main use of a winter building is when temperatures drop below zero degrees Celsius. The Qibla is to the west, and the west is blocked with thick walls so that people who are praying are not distracted. A total of 18 of 26 mosque complexes have buildings (built-up areas) on their western sides, and the west is blocked and is directly attached to residential properties (Fig. 4, Tables 4, 5 and 6). At the same time, eight remaining mosques have buildings (built-up areas) on their south and north sides, whereas their west sides do not have buildings, but their built-up areas on the south and north have blocked sides in the west with Mihrab. (Fig. 4; four cases of L and four cases of II). There may be reasons for blocking the western side: desire to face the Qibla direction, to prevent distractions for prayer people, or to form a tight urban fabric surrounding the mosques.

A summer building is used as a prayer area during the hot summer months of April to August when temperatures exceed 45 degrees Celsius. While it is possible to find mosques with two winter buildings, there are no mosques with two summer buildings. A building in Afghanistan receives sunlight from both north and east–west directions since the country is 29 degrees from the equator. During good weather (mild winds, no rain

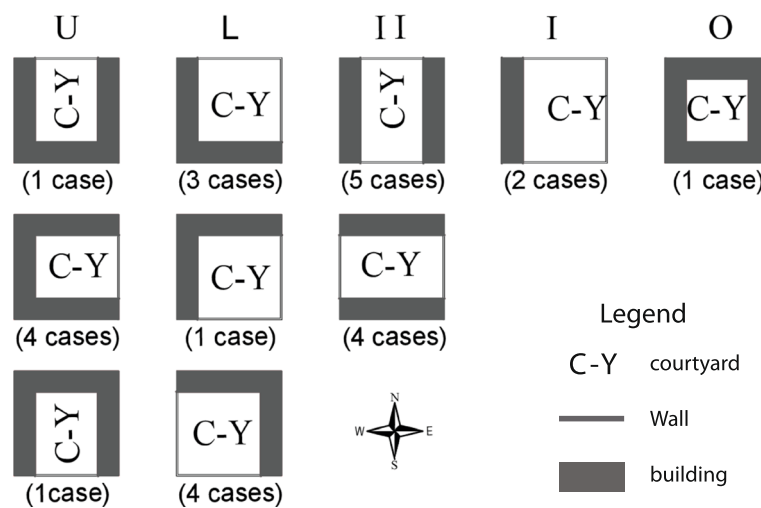


Fig. 4 Types of mosques based on shape of courtyard (source: the authors)

Table 4 Existing condition of mosques based on type of shape

Types of Transformation	Shape/type of mosque plan					Total
	U	L	II	I	O	
Preserved	3	7	3			13
Transformed	3	1	6	2	1	13
Total	6	8	9	2	1	26

Table 5 Number of winter buildings

Direction	U	L	II	I	O	Total
North	2	4	2		1	
South						
West	5	4	6	2	1	
East						
Total	7	8	8	2	1	26

Notes,

Table 6 Number of summer buildings

Direction	U	L	II	I	O	Total
North						
South	5	2	2		1	
West						
East						
Total	5	2	2		1	10

Notes,

or snow), open prayer areas are used without buildings or walls. The height of an open prayer area from ground level is 40–60 cm.

Mosque complexes are composed of connected parts arranged in a way that form an encircled courtyard (courtyard is an open space area comprising an open prayer area, a green area, and pathways). Buildings surrounding the courtyard form various shapes based on their locations, including U, L, II, I, and O shapes (Fig. 4), as described below. As mosque buildings are in densely urban areas, they are not open to the outside because of the surrounding residential and commercial buildings, but they are open at the courtyards inside. Among the most significant aspects of this study is the transformation of space composition, which shows that every mosque has a courtyard, and there are no mosques without them.

The U-shaped complex consists of six mosques whose courtyards are surrounded by buildings on three sides and are enclosed by a protective wall on only one side. In one case facing the north, the winter building was constructed on the west side, the summer building on the south side, and the equipment on the east side (including bathrooms, Wozo Khana, toilets, etc.). Four mosques are open to the east with winter buildings in the west or north, summer buildings in the south, and equipment adjacent to either winter or summer buildings in the south or north. The equipment can be found on every side of a mosque, and there are no specific locations for it. Compared to the other types of mosques, U-type mosques have more rooms and parts, making them more functional. There were madrasa spaces for students of religious education in four of six mosques.

The L-shaped plan comprises eight mosques, with a courtyard surrounded by structures in two directions and enclosed by two protective walls on the other sides. In the three cases, the winter buildings are in the west, while the summer buildings, the Hojrah, toilets, and washing areas are located on either the northern or southern sides. On one occasion, the winter building was constructed on the western side, and other equipment was built on the northern side. In four cases, the winter buildings are in the north, while equipment such as toilets and washing areas are in the east, and there are no buildings in the west or south. Four mosques, which have one main building as a winter building and are on the northern side, do not have summer buildings, but they use Bad-gir to keep cool when used as summer mosques. Few cases of this type of mosque have room for madrasas and Tullab (students) due to its lack of space.

The II-shaped mosque comprises nine cases, having a courtyard surrounded by buildings from one side and enclosed by a protective wall from two sides. Among

the nine cases, five have winter buildings located on the western side of the mosque, while other parts, such as the Hojrah, washing areas, and toilets, are located on the eastern side. Among those five cases, there are no buildings in the northern and southern parts of these mosques. In some cases, east-side buildings include small equipment rooms, which tend to be smaller. For four buildings, the winter building is in the north, while other parts, including the summer building, are in the south. Due to the smaller space of this type of mosque, there are fewer opportunities for madrasas and Tullab (religious students).

The I-shaped mosque comprises two cases, having a series of buildings on one side and a courtyard encircled by three walls from the other three directions. In only two cases, the equipment was built alongside the western winter building of a mosque complex as spots scattered in different places. Neither complex had any buildings on its other three sides. There is no Hojrah (room) for *Imam* (locals call *Mullah*, *Aakhond*).

The O-shaped Mosque, which is an extended form of a U, is surrounded by buildings from all directions, forming a courtyard at the centre. Only one case had buildings (built areas) on all sides. A winter building was positioned in the west, a summer building was in the south, and other structures were located on the north and south sides. As an extension of type U, this building contains a madrasa, a dormitory, classrooms, and rooms for *imams* and lectures.

As shown in Table 7, Kuchah routes are home to the greatest types, L with 6 cases (mosques), II with 8 cases (mosques), and U with 5 cases (mosques).

Among the 26 mosques, all have winter buildings, only 10 (34.6%) have summer buildings, and 24 have open prayer areas. In a mosque complex, summer buildings are always located in the southern part. Due to the weather conditions, the southern part of the sites is the best for receiving fresh air from windows open towards the north and is not subjected to harsh sunlight from spring to fall, mainly in summer. Winter buildings are in the west and sometimes in the north. Open prayer areas are always connected to the winter building or in the middle of the winter and summer buildings, near the central parts of a mosque, and are thus located in the western part/half of the courtyard (open space). Thus, even though nearly half of the mosque cases (12 out of 26) have a built area in the east (Fig. 4), there is no prayer area in the eastern part of a mosque complex. Additionally, there are two mosques with open prayer areas without any mosque features. However, these open areas are sometimes used for prayer. A mosque's equipment (such as bathrooms and toilets) is usually located near or along its winter or

Table 7 Plan and route relationship

Route (access)	Shape/type of mosque plan					Total
	U	L	II	I	O	
Kheyaban (highway)						
Jaddah (street, road)	1	2	2	1	1	7
Kuchah (alley)	5	6	5	1		17
Bonbast (dead-end)			2			2
Total	6	8	9	2	1	26

summer buildings. In addition, it is mostly separated/segregated in the east.

In the case that a mosque does not have a summer building, the winter building is also used during summer by opening/utilising Bad-gir for ventilation and cooling. Mosques with a single main building (winter building in the west or north) are used as summer buildings in the summers by opening their Bad-gir either on the roof or at the top of the northern wall. A bad-gir is a common feature of both winter and summer buildings, except for two summer buildings that have open sides in the north. Bad-gir helps ventilate and cool winter buildings, but sunlight still increases the temperature in winter buildings compared to summer buildings. With Bad-gir and no sunlight entering summer buildings, the building is much cooler. Among the 13 preserved mosques (5 mosques have summer buildings), nine mosques have Bad-gir, which are open in summers to cool the buildings and are closed in the winters to maintain the interior heat. Furthermore, there are two courtyards without open prayer areas.

The study area has 26 traditional mosques where we found 28 winter buildings. Twenty-four mosques have one winter building each, and two mosques have two winter buildings each. After an increase in population according to the residents and users of the mosques, a second winter building was possibly attached to the first/earlier one in the northern part of the mosque's site. At the same time, there is no mosque with two summer buildings.

Among the 10 mosques with summer buildings in their southern parts (Table 7), five are U-shaped mosques, two are L-shaped mosques, two are II-shaped mosques, and one is an O-shaped mosque. Three of the five buildings in the U-shaped type are closed in all directions, while 2 out of the five cases have open sides in their northern views. An example is illustrated as the first case study in this article (Fig. 5, case one, Malik Mosque). Of the ten summer buildings, two buildings have open sides facing north, while the other eight have walls facing north.

In a mosque, an open prayer area is part of the open area that has the features of a mosque, such as a Mihrab, or at least a designated place for *Imam* (on the western side) and is typically connected to a winter mosque (Fig. 5, b, #3; Fig. 6, b, #3; Fig. 7, b, #5). Furthermore, the prayer area is elevated 40–60 cm above ground level, and shoes are not allowed on it. Open areas consist of open prayer areas, pathways, and gardens and are surrounded by buildings from one to four sides.

Among the ten mosques having both summer and winter buildings, the original residents having knowledge about the Old City and traditional buildings (of 8 mosques) were asked the order in which winter and summer buildings were constructed to discover the development process, original shape of plans and sites. It was reported to us during our interviews that five mosques were built in the order of construction, with winter buildings being built first and summer buildings being constructed later. For the remaining five mosques, we were unable to confirm an answer, so further investigation is needed. The winter buildings were built first, possibly due to the need to prepare for heavy rainfall, snowfall, or cold temperatures. In cases where the residents had economic power and land availability, summer buildings were also constructed.

4 Case studies of mosques

Among the most common types of mosques in the region, we selected three mosques for conducting case study analysis, which included the most significant number of components. The Malik Mosque is a U shape preserved mosque, the Sheer Shah Suri Mosque is a II plan shape preserved mosque, and the Sadia Mosque is an O plan shape transformed mosque.

The Malik and Suri mosques are in good condition, having been restored by AKTC during the restoration program of Herat Old City conducted from 2005–10. The Sadia Mosque was completely transformed from traditional material to modern (concrete with reinforcement) in 2004 (Asim Shimizu 2022a; AKTC 2008; Jodidio 2017). Before the restoration program began in

2005, the mosque underwent a transformation. The first two cases were chosen because they represent existing traditional preserved mosques, as well as their architectural features (U and II shapes), while the last case is chosen since it represents a transformation from traditional materials to concrete reinforcements as well as its unique shape (O), which was the most functional among the mosques.

There are six U-shaped mosques, three of which have already been demolished, and three others that are preserved and share similar features, however, Malik has the most function, traditional materials, and the most prominent location representing the whole group of U-shaped mosques. There are nine II-shaped buildings with similar functions and architectural features, but Sheer Shah Suri stands out because, in addition to all other similar features, it has a shrine at one corner and has the oldest wooden material, as well as the most decorations, likely Timurid decorations. Among the 13 transformed traditional mosques, the Sadiyeh mosque with an O shape was chosen because it features all characteristics of shapes, such as I, II, L, and U, in terms of the number of functions, size, location, and shops on its eastern side.

Twenty-eight out of the 57 interviewees in this study, who are original residents over 50 years old, are beneficiaries (users) of the following three case studies. There were three current and three former local leaders interviewed, six retired schoolteachers, nine typical residents, and seven traditional masons, all of whom were over 50 years old. They were asked about the three following case studies' usage, background (general characteristics), and architectural features.

4.1 Nawab (Malik), The case of a preserved mosque (U shaped)

The site of Malik Mosque, which has been preserved until today, is in front of the western gate of the Citadel in the Quzzat quarter. According to the oral stories of the residents, the origin of this praying area traces back to the establishment of the Citadel before 330s BC. Nawab (Malik) mosque was primarily a fire temple that was transformed to a mosque after Arabs conquered Herat in AC 633. The Grand Mosque of Herat and Gunbad Noor mosque are other documented examples of transformed fire temples to a mosque (Ghawas 1984; Seljuki 1989).

The prayer rooms of Malik Mosque lie on the west and south sides, while the equipment lies on the north side, making it a U-shaped structure. The Malik complex is located on a Jaddah (street) surrounded by dense residential houses to the west and south and a Kuchah (alley) to the north. It is not open to the outside and has windows

facing the courtyard. The gate of the building (main gate) opens in the north-eastern corner towards Malik Road (Jaddah) entering the courtyard (Sahn) of the mosque. Jodidio reported that the brick domed water cistern comprising the eastern part of the courtyard (Fig. 5) has been the main water source for the residents of Darb-e Malik (Jodidio 2017). The northern area is composed of rooms for washing places and toilets (Teshnab, Dast-Sho-i), and the western building is composed of three connected rooms utilised as winter buildings with their equipment. The southern area is composed of a large hall used as the summer building. Hojrah, on the second-floor level, students' rooms (Otaq-e Tullab), Talib, referred to as a person who seeks religious education, and the east side of the courtyard of the mosque are connected to the Malik cistern. The courtyard is divided into walking paths (*Rahraw*) and open prayer areas. The open prayer area is a 40–60 cm elevated area above the ground with a Mihrab on the western side of the structure that is often used as a prayer area in the Asr time and sometimes used in the evening (*Shaam*) and night prayers (*Khufstan*). The space of the 2nd story is composed of a void space for setting and sleeping in open air (*Takht-Baam*), rooms for students (Otaq-e Tullab), a room for religious leader (*Imam*), and parapet walls (*Dewar Jon Panah*), which have surrounded all components of the roof from four sides.

Heravi reported in his book entitled 'Herat Cisterns' (ponds) that the western building (referring to the winter mosque) of Malik Mosque was constructed before the southern building, or the summer building (Heravi 2005). During our interviews with original residents on the order of construction, based on oral stories passed down from ancestors, there was a confirmed fire temple before it was transformed to a mosque in the early Islamic period, which means that the current winter building was originally constructed as the first and only building before Islam (Herat Grand Mosque and Gunbad-e Noor are also reported as fire temples before Islam, Herat-e Bastan Magazine). It was then reconstructed, and other attachments were added to make it suitable as a mosque. The residents believe that this mosque has been reconstructed several times. The winter building has Bad-gir in two places, as shown in Fig. 5, and is equipped with modern glass windows that were once opened in hot summers and used for cooling and daylighting. Bad-gir was previously closed with mud-clay, but now it is covered with glass windows that allow sunlight and cooling in summer. After the construction of the summer building (for summer use), the Bad-gir of the winter building may have been closed/ blocked (a gate has been installed and can be opened in case of need).



Fig. 5 Case one, Malik mosque (and cistern), 2021 (source: the authors)

The arch on the northern side of the summer building is open for wind flow and daylight. The residents (users) claimed that this old, ancient mosque is very comfortable in a traditional way in both summers and winters in terms of heat. Thick traditional walls prevent heat transfer, which requires further detailed research.

The courtyard has paths (*Rahraw*), trees, and an open prayer area to the west. In the second story, there are rooms for students (*Otaq-e Tullab*) and a room for the

religious leader (*Imam*). The roof space is surrounded by parapet walls (*Dewar Jon Panah*).

4.2 Sheer Shah Suri (M. A. Khan): The case of a preserved mosque (II shaped)

The site of the Soori mosque, which has been preserved to this day, is in the Dalan alley at the southeastern corner of the Quzzat quarter, near the city centre of Chaharso. A broken inscription indicates a date (1498) coinciding



e) northern view of southern building



f) eastern view of western building

No	Persian term	English equall word or meaning
1	<i>Masjid-e Zamistoni</i>	winter, main building
2	<i>Masjid-e Tabistoni</i>	summer building
3	<i>Takht (Masjid Asr)</i>	open prayer area
4	<i>Iwan (void)</i>	winter building Iwan
5	<i>Rah-Pallah</i>	stairs
6	<i>Dallanchah</i>	Entrance hall, storage
7	<i>Hojrah</i>	room for Imam (leader)
8	<i>Roshai</i>	face washing area
9	<i>Wozo khana</i>	Body washing area
10	<i>Dast-sho, Kanarab</i>	Toilet
11	<i>Rah-rouw, Dalancha</i>	Walking path, entrance hall
12	<i>Khab-gah</i>	Dormitory (religious students)
13	<i>Khab-gah</i>	Dormitory (religious students)

with the Timurid era, 1370–1507. It is not clear that the building was either constructed or reconstructed by the Timurids, as its inscription is unreadable.

Suri mosque is a type II plan, as the mosque has rooms for *Imam* and *Tullab* in the east and the main mosque, winter building, in the west. Soori mosque is in an alley (*Kuchah*) surrounded by dense residential houses on three sides and a *Kuchah* on one side, with windows open to the courtyard. The rooms in the eastern part are shorter in length than those in the western edifice. The gate of the building opens in the north towards the alley (*Kuchah* with *Dalan*).

The western part of the mosque contains the only a building comprising three connected square rooms used for prayer, and the eastern part contains the bathrooms (*Teshnab*, *Dasht-Sho-I*). There are pathways (*Rah-raw*), gardens, a shrine, and an open prayer area in the courtyard. The main building is composed of three-square rooms supported by arches. The main ceiling is domed shape and is pendentive, ornamented with *Muqarnas*, tiles, and arches. Its main building has no *Bad-gir* in the roof/ceiling while the *Bad-gir* has descended to lower than the arch and above the normal doors and windows. There is no other edifice except the summer building,

shown in Fig. 5 (just here). This is equipped with modern glass windows that are opened in hot summers and are used for cooling and daylighting. This kind of *Bad-gir* had wooden windows previously, but now it is closed by its glass windows, allowing for daylighting and cooling during the summers. The residents (users) claimed that this old, ancient mosque in a traditional way is very comfortable in both summers and winters in terms of heat. Thick traditional walls prevent heat transfer, an element which needs further detailed research.

The courtyard is divided into an open prayer area, a small garden (*Bagh-cha*), a shrine, and several pathways. It has a one-story building with high elevated rooms, and the surrounding wall is traditionally composed of arches and shelves.

4.3 Sadiyeh (Ghaudal), The case of a transformed mosque (O shaped)

The site of the Sadiyeh mosque, transformed (demolished and reconstructed), is just at the intersection of *Jaddah-e Lelami* and *Jaddah-e Malik* in the eastern part of the Quzzat quarter of the Old City. According to an Archnet report, the mosque was constructed in 1936, before WWII (AKTC 2008), and was rebuilt as a

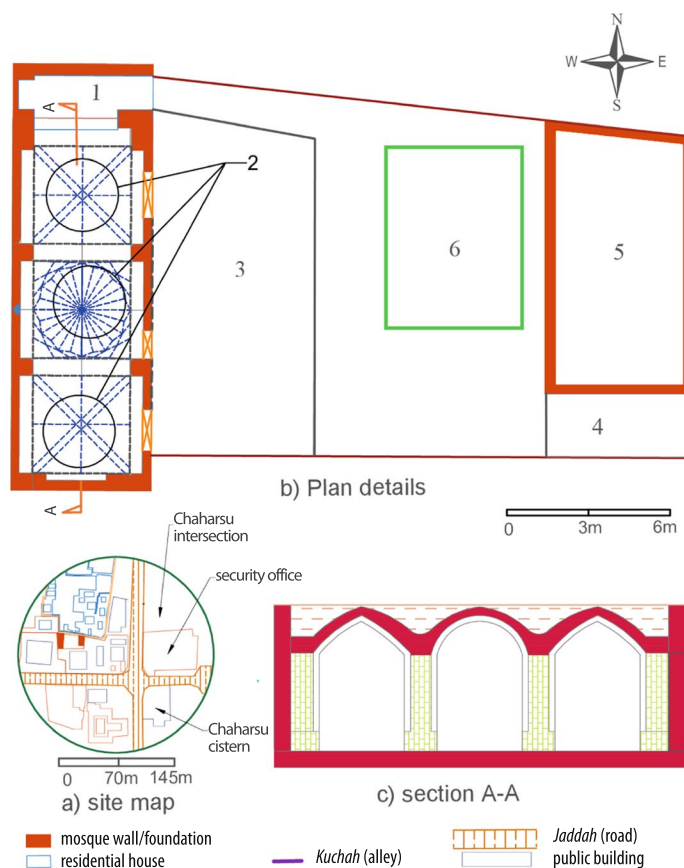
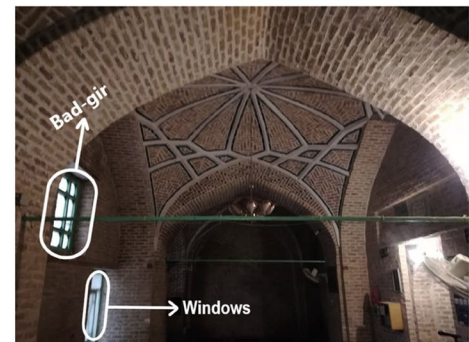


Fig. 6 Case two, Sheer Shah-e Soori mosque, 2021 (source: the authors)



d) interior view of the mosque, winter building

(Note: *Bad-gir* Dewari is like a high side window used for ventilation, but is blocked since fan is utilized on the opposite side/wall.)

No	Persian term	English meaning
1	<i>Dalanchah</i>	Entrance hall
2	<i>Masjid Zamistoni</i>	winter building, main mosque
3	<i>Takht (Masjid-e Asr)</i>	open prayer area
4	<i>Qabr</i>	graveyard
5	<i>Roshoi</i>	face washing area
	<i>Wozo khana</i>	body washing area
	<i>Dast Sho, Kanarab</i>	toilet
6	<i>Baghchah</i>	Small garden, green space

(Note: *Bad-gir* is closed after electric fan is introduced.)

concrete structure in 2005. Sadiyeh mosque is located on a Jaddah (Street) surrounded by dense residential houses on three sides and a Jaddah with a tight commercial area on the eastern side.

As mentioned earlier, UNESCO and AKTC pushed the government to impose guidelines and rules to prohibit construction or reconstruction under certain conditions (chapter 1.2), whereas it was found that it did not fully adhere to the criteria. A local traditional stone called Marmar is used to decorate the surface of the building, but the rest of it is made up of metal windows and doors, and glass windows were added. In this case, the Afghan government has been unwilling to implement the criteria effectively.

Only one photo is found and reported on the destruction of the mosque (Fig. 7, a. AKTC 2008). Hence, GIS software was utilised to draw the plan of the mosque using GIS imagery 2001 as a base map. The mosque is the only O type plan in the quarter. The original traditional mosque had rooms rented to shopkeepers and were utilised as shops in the east, winter building in the west, another winter building in the north and a series

of rooms utilised as madrasa to the northern side. The residents reported that this mosque had Bad-gir that was not reconstructed after the traditional mosque was transformed into a modern concrete structure. The residents claimed that after the traditional mosque was transformed into a concrete modern mosque, they did not feel comfortable in terms of the heat. The concrete walls and ceiling absorb a lot of heat and make like a bathroom in summers and like a fridge in winters.

The gate opens eastwards towards Malik Road (Jaddah), with a small passage, having rooms and shops on both sides, leading to the mosque's courtyard (Sahn). The northern area was composed of rooms considered for winter buildings, washing places, and toilets (Teshnab, Dast Sho-e), and the western area was composed of winter buildings. The southern area was composed of a hall as the summer building, Hojrah, students' rooms (Otaq-e Tullab), and the east side was composed of rooms for students and shops. The courtyard was divided into pathways (Rah-raw), gardens, and open mosques. The open prayer area (Takht) is a 40–60 cm elevated area above ground level with

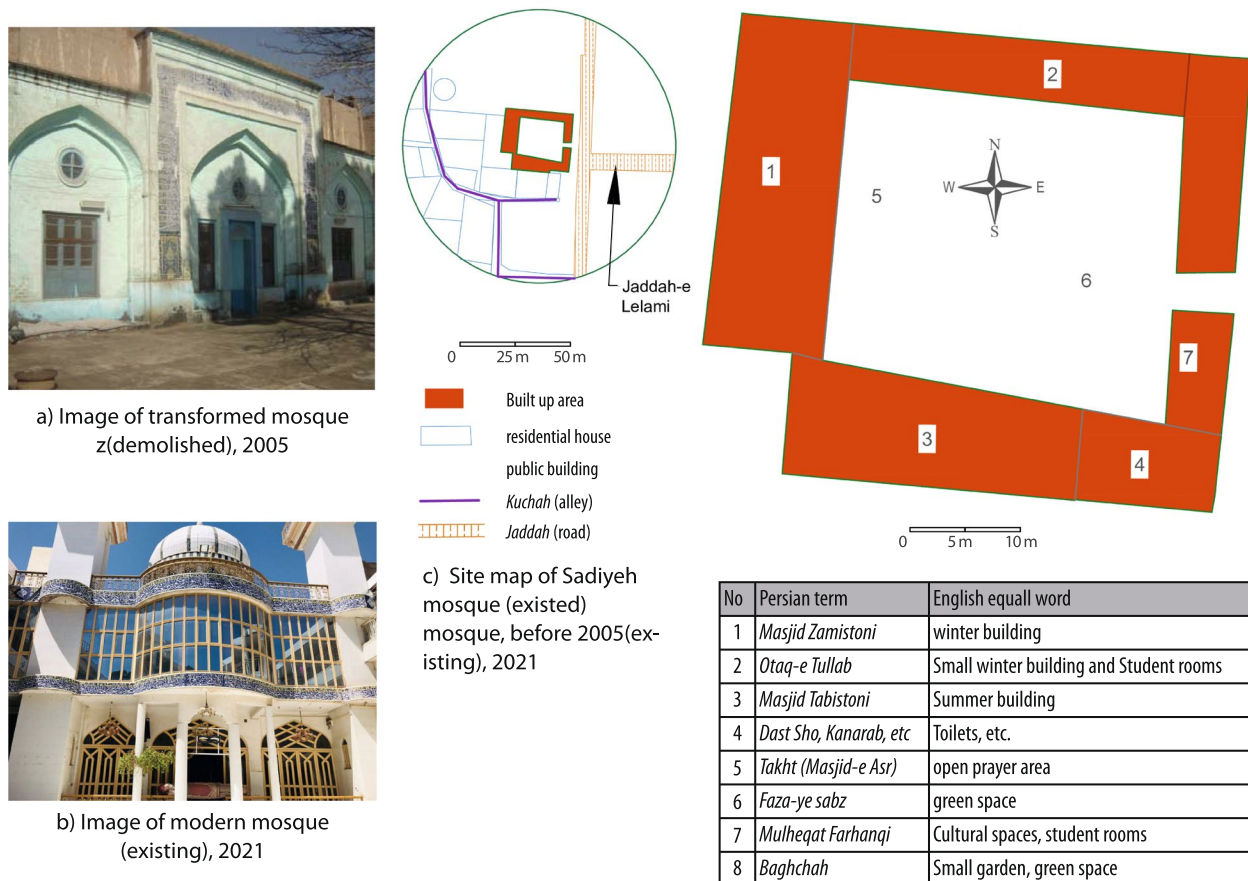


Fig. 7 Case three, Ghaudal or Saadia mosque, 2021 (Source: the authors)

a Mihrab connected to the winter prayer area on the western side of the mosque. Due to its location on a street that is convenient for availability of shops to rent, this mosque is the only traditional mosque constructed in an O-plan shape.

The report by AKTC emphasised the significance of this mosque as comprising a series of domed buildings constructed around a large courtyard decorated with fine glazed tile inscriptions on the western façade. The report added that it was one of the typical mosques in the Old City, many of which disappeared or radically changed (AKTC 2008).

The courtyard was divided into pathways (Rah-raw), green areas (Bagh-cha) and open prayer areas. Due to its location on a street that is convenient for having shops to rent, this mosque is the only traditional mosque having spaces for shops.

5 Conclusion and discussion

An important aspect of this study is the analysis of site plans.

This study was conducted to analyse the features of traditional mosques in the Quzzat quarter of Herat Old City. Many factors related to mosques were considered during the study, including existing condition, geographic location, number of floors, and types of mosque plans. The study found the general features of mosques as follows.

- a) Four types of routes were identified: Kheyaban (highway), Jaddah (street), Kuchah (alley), and Bombast (dead-end alley). Comparatively, Kuchah has a larger concentration of mosques with more traditional features than the other routes.
- b) All traditional mosques have one floor level above the ground level, and there are no more than two floor levels (stories). Five cases have underground floors as well.
- c) A traditional mosque has three types of praying areas, Masjid-e Zamistoni (winter building), Masjid Tabistoni (summer building) and Takht (literally meaning throne), an open prayer area used before/during sunset, and at night). The most common component among all mosques is the winter building, followed by the open prayer area. Twenty-four out of the 26 traditional mosques have an open prayer area, while two out of the 26 mosques have open space with no mosque features, such as Mihrab, and 10 out of the 26 traditional mosques have summer buildings.
- d) A courtyard is composed of a garden or green area plus an open prayer area and pathways. A courtyard can be found in every traditional mosque. Courtyards are a common feature of traditional mosques and are

surrounded by built areas that form one of the U, L, II, I and O shapes. L-shape plans are the most common, and O-shape plans are the least common. Type I is the smallest in size and site area ratio. The most common type of mosque in the study area is type II, and the least common type is O. Although not the most common shape, U-shaped mosques offer more features than other types, such as madrasas, *Imam* rooms, *Tullab* rooms, equipment, and religious education facilities.

- e) The winter buildings are mainly in the west and then in the north of a mosque complex, while the summer building is always located in the south. Mosques with one building are utilised as both summer and winter buildings, while only in summer is the Bad-gir opened and utilised for cooling. Buildings on the northern sides of mosques are usually equipped with Bad-gir in the summer to allow wind to flow and cool the interior. Residents were interviewed to determine the order of construction for winter and summer buildings. For five out of ten mosques, the winter buildings were built earlier than their summer buildings, whereas we were unable to obtain information for the rest.

As the first case study, Malik Mosque on Malik Road (Jaddah) has a winter building on the western side, a summer building on the southern side, and equipment on the northern side, all of which surround a courtyard in the middle, creating a U shape plan that represents its group. Four of the six U-shaped mosques, which represent a majority in the group, have winter buildings in the west, including Malik.

In the second case study, Sheer Shah Soori Mosque on an alley (Kuchah) has a winter building on the western side, no summer building (prayer area), and equipment on the eastern side. All facilities and the two walls in the north and south directions surround a courtyard in the middle, creating a II shape plan that represents its group. A unique case among its group, the Soori mosque is the oldest, most preserved, and has Muqarnas and traditional ornaments on its ceilings.

Sadiyeh (Ghaudal) mosque has a winter building on the western side, a winter building on the north, a summer building on the south, equipment, and shops in the east and eastern corners and surrounds a courtyard in the middle to create an O-plan. The winter building is the first built area in this mosque. The mosque may be an extended version of a C-shaped mosque that had more features than any other structure in the study area. In Sadiyeh, the challenge lies in conducting a thorough GIS analysis and conducting a field survey on an already lost case study.

This paper is focused on the general features of mosques in the Quzzat quarter of the Old City. Further studies should analyse the detailed features from different perspectives, such as architectural, artistic, historical, and epigraphic perspectives.

The study illustrates the potential role of climate in shaping the plan forms in the study area. The winter building serving as the main mosque in the west is not sufficient when the weather is hot. Therefore, a second building has emerged to address hot summers and climate toughness. When the outside air is fresh with a mild breeze, open space can also be used for praying. A question remains about whether residential houses with three different spaces are similar to mosques.

Traditional mosque plan typology is one of the most important aspects of this study and should be considered in future studies on brick-built mosque structures. To gain a deeper understanding of traditional mosques in Afghanistan and the region surrounding it, the authors describe the shape and features of the plans and create a typology of them. A satellite image was used to detect and digitise the shape of buildings, followed by a field survey that identified the mosque's components that can be imitated and further developed by other researchers in the future.

Despite a wide range of studies, three types of prayer areas, winter buildings, summer buildings, and open prayer areas, have not been fully observed. Research on this topic may be explored further in other countries with similar cultures and climates, such as Iran, Uzbekistan, and Tajikistan. From satellite images, we can see that these buildings are unique in this region and need further research in other countries using field surveys.

In this study, only traditional mosques were examined, whereas further research is needed on other structures, such as houses, shrines, schools, and madrasas. The study focused only on one quarter of the Herat Old City; however, there are three other quarters with similar traditional buildings, possibly in different situations and with different features. It might not be possible to conduct a survey now, but once the stability returns, further research should be conducted.

Abbreviations

UNESCO	United Nations Educational, Scientific, and Cultural Organisation
AKTC	Aga Khan Trust for Culture.
GIS	Global Positioning System.
ZZ	Zeer Zamini
NGOs	Non-Governmental Organisations

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References

- Abu, H. 1970. *جغرافیای حافظ ابرو* [Geography of Hafez Abru]. Edited by M. Heravi. Bonyad Farhang Iran Publications, Iran. <http://kaffeketab.ir/دانلود-کتاب-جغرافیای-حافظ-ابرو/>.
- AbulQaraya, B. 2015. The Civic and Cultural Role of the Sheikh Zayed Grand Mosque. *Procedia-Social and Behavioral Sciences* 211: 488–497. <https://doi.org/10.1016/j.sbspro.2015.11.065>.
- Adi, S. M., and C. Puspitasari. 2016. Mosques as a model of learning principles of sustainable architecture. *Journal of Islamic architecture* 4 (1): 33–36. <https://doi.org/10.18860/jia.v4i1.3090>.
- Ahmad, Azizul Azli, Aizan Ali@Mat Zin, and Ezrin Arbi. 2013. Typology of interior architecture for traditional mosques in Peninsular Malaysia from 1700 – 1900 AD (Tipologi Seni Bina Masjid-Masjid Tradisional Di Semenanjung Malaysia Dari 1700 & “ 1900 Masihi). *Journal of Al-Tamaddun* 8 (2):89–100. Proceeding of the International Conference on Arabic Studies and Islamic Civilization iCasic 2014. <https://samudera.um.edu.my/index.php/JAT/article/view/8664>.
- Ahrari, A. K. 1931. *Rasala-e Mazarat Ba Barakaat* (in Persian). Danish Press, Iran.
- AKTC newsletter #15. Destruction of Sadiyeh Mosque. 2008. https://www.akdn.org/akdn/sites/akdn/files/Publications/2008_aktc_september_afghanistan.pdf. Accessed 29 Aug 2021.
- Al-Heravi, S. I. M. I. Y. 1943. *تاریخنامه هرات* [The history book of Herat]. Edited by Mohammad Zubair Seddiqi. Khayam Library publications, Iran. <https://ketabnak.com/redirect.php?dliid=105296>.
- Asfazari, M. 1960. *روضات الجنات، فی اوصاف مدینته هرات* [Rouzatul Jannat in Persian]. Edited by S. M. K. Imam. Tehran: Tehran University. <https://ketabnak.com/redirect.php?dliid=72879>.
- Ashrafi, Nabila. 2021. Herat City to Be Listed as UNESCO World Heritage Site. *Tolo News*, July 2. <https://tolonews.com/arts-culture-173228>. Accessed 29 Aug 2021.
- Asim, G. M., and H. Shimizu. 2022a. Transformation Analysis of Traditional Mosques: The Case of Quzzat Quarter of Herat Old City, Afghanistan. *Heritage* 5 (3): 1819–1835. <https://doi.org/10.3390/heritage5030094>.
- Asim, G. M., and H. Shimizu. 2022b. Analyses and Architectural Typology of Preserved Traditional Mosques in the Old City of Herat in Afghanistan: The Case of Quzzat Quarter. *Built Heritage* 5 (4): 51–64. <https://doi.org/10.1186/s43238-022-00070-0>.
- Asim, G.M., and T. Ando. 2020. A Study on Cisterns in the Herat Old City, Afghanistan. *Journal of Architecture and Planning (transactions of AIJ)* 85: 781–789. <https://doi.org/10.3130/aiaa.85.781>.
- Astakhri, A. E. I. (2007) Roads and countries in Arabic Masalik wal Mamalik (مسالك والممالك), Iraj Afshar, Karim Kaydan, Iran. <https://ketabnak.com/book/82375/مسالك-و-ممالك>.
- Azizi-Bondarabadi, H., and N. Haji Sadeghi. 2022. Local seismic culture in Iranian vernacular architecture: Evidence from Yazd earthen architecture. *Built Heritage* 6 (2): 1–23. <https://doi.org/10.1186/s43238-022-00051-3>.
- Budi, B. S. 2004. A study on the History and Development of the Javanese Mosque Part 1. *Journal of Asian Architecture and Building Engineering* 3 (1): 189–195. <https://doi.org/10.3130/jaabe.3.189>.

- Carlos, Gilberto, Telma Ribeiro, Maddalena Achenza, Cristina Cruz Ferreira de Oliveira, and Humberto Varum. 2022. Literature review on earthen vernacular heritage: Contributions to a referential framework. *Built Heritage* 6 (2): 43–54. <https://doi.org/10.1186/s43238-022-00061-1>.
- Constitutional Law 2004. <https://www.aihrc.org.af/media/files/Laws/Dari/Constitutional-law.pdf>.
- Correia, M., and G. Duarte Carlos. 2021. Introduction: Earthen architecture, an endangered vernacular heritage. *Built Heritage* 5 (4): 1–2. <https://doi.org/10.1186/s43238-021-00046-6>.
- Gammell, C. P. W. 2016. *The Pearl of Khorasan: A History of Herat*. London: Hurst Publishers. <https://www.bookdepository.com/Pearl-Khorasan-C-P-W-Gammell/9781849046541>.
- Ghawas, M. A. 1984. مسجد گنبد [Masjid-e Gunbad]. Herat: Bastan magazine (Numbers 2 and 3, fourth year).
- Hamawi, Y. S. A. A. 2006. مجمع البلدان [Majamul Baladan in Arabic]. Translated by Ali Naqi Monzawi in Persian. Tehran, Iran.
- Heravi, M. S. 2005. *Book of Cisterns* [in Persian]. Mashhad, Iran: Sunbulah Publications.
- Heritage law 2004. قانون Ministry of Information and Culture. <http://moic.gov.af>. Accessed 10 Oct 2022.
- Hillenbrand, R. 1982. *The flanged tomb tower at Bastam*. Edinburgh: University of Edinburgh.
- Ibn-Resta, A. A. A. I. O. 1892. الاطلاق النفيسة [Al Alaaqu-l Nafisa or precious attachments (cities)]. First publication in tenth century. Beirut, Lebanon: Daar Sadir publ.
- Jodidio, 2017. *Afghanistan: Preserving Historical Heritage*. Munich: Prestel. <https://www.alibris.com/Afghanistan-Preserving-Historic-Heritage-Philip-Jodidio/book/44676252>.
- Loda, M., G. D. Benedetto, M. Hinz, M. Preite, M. Tartaglia, G. Maciocco, A. Valentini, et al. 2013. *Herat Strategic Master Plan: A Vision for the Future*. Firenze: Polistampa. http://www.lages.eu/wp-content/uploads/2017/05/Indice-da-Masterplan_Herat.pdf.
- Maqdisi, A. A. M. 1982. احسن التقاسيم في معرفة الاقاليم [The best divisions in the knowledge of the regions, in Arabic and Persian]. Translated by Ali Naqawi. Tehran: Monzawi, Kawian publications. <http://ketabnak.com/book/105596/-احسن-التقاسيم-في-معرفة-الاقاليم-جلد-1>.
- MCI (Ministry of Culture, Information). 2021. *A Copy of Herat Projects*. Kabul, Afghanistan: Archival Directorate.
- Moriset, S., B. Rakotomamonjy, and D. Gandreau. 2021. Can earthen architectural heritage save us? *Built Heritage* 5 (4): 3–13. <https://doi.org/10.1186/s43238-021-00041-x>.
- Mustafa, F. A., and A. S. Hassan. 2013. Mosque layout design: An analytical study of mosque layouts in the early Ottoman period. *Frontiers of Architectural Research* 2 (4): 445–456. <https://doi.org/10.1016/j.foar.2013.08.005>.
- Najimi, A. W. 1988. *Herat: The Islamic City, A Study in Urban Conservation*. London: Scandinavian Institute of Asian Studies/Curzon Press.
- Niedermeyer, O. V. 1924. *Afghanistan*. Leipzig, Germany.
- Noelle-Karimi, C. 2014. *Pearl in Its Midst: Herat and the Mapping of Khurasan (15th-19th Centuries)*. Wien: Austrian Academy of Sciences Press. <https://doi.org/10.2307/j.ctt1vw0pfw>.
- Raheeq, H. 1984. مدارس هرات [Herat Madrasas]. Herat: Bastan Magazine.
- Rajayee, M. 1984. حوضهای سر پوشیده هرات [Herat covered cisterns]. Herat: Bastan Magazine.
- Reap, J. K. 2022. Introduction: Heritage legislation and management. *Built Heritage* 6 (1): 1–3. <https://doi.org/10.1186/s43238-022-00059-9>.
- Redjem, M., and S. Mazouz. 2022. Spatial and social interaction in medieval Algerian mosques: A morphological analysis using space syntax. *Built Heritage* 6 (2): 55–75. <https://doi.org/10.1186/s43238-022-00064-y>.
- Rules 2005. Agreement on Preservation of Tangible Cultural Heritage of Herat Province. Kabul, Afghanistan: Ministry of Culture, Information, Archival Directorate. <http://moic.gov.af>.
- Samimi, A. S., T. Ando, and K. Kawish. 2017. A study on the transformation of Herat Old City. *Journal of Architecture and Planning (transactions of AIJ)* 82 (735): 1367–1375. <https://doi.org/10.3130/aija.82.1367>.
- Samimi, S. A. B., T. Ando, and K. Kawish. 2019. Analysis of the Transformation of Herat Old City, Afghanistan. *Conservation and Management of Archaeological Sites* 21 (3): 143–159. <https://doi.org/10.1080/13505033.2019.1664626>.
- Seljuki, F. 1964. *Kheyaban: Street* [in Persian]. Herat: Jami Association Press.
- Seljuki, F. 1968. *Herat Naameh, Book of Herat* [in Persian]. Kabul: Ariana Magazine.
- Seljuki, F. 1989. *Book of Herat Shrines* [in Persian]. Edited by Malik Jovaini. Iran: Tauwheed Press.
- UNESCO. 2004. The city of Herat. Ministry of Information and Culture of Afghanistan. <https://whc.unesco.org/en/tentativelists/1927/>. Accessed 29 Aug 2021.
- UNESCO. 2021. UNESCO calls for the protection of cultural heritage. <https://whc.unesco.org/en/news/2333>.
- Zhang, C. 2022. Introduction: Tourism and built heritage. *Built Heritage* 6 (3): 1–3. <https://doi.org/10.1186/s43238-022-00078-6>.

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