Translated Paper

Spatial structure of a courtyard-style settlement originating from a Buddhist monastery: A study of a cooperative space management system in an old city area of Patan, part 1

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Abstract

In this paper, the spatial characteristics of a courtyard-style settlement (Bahā/Bahī, originating from Buddhist Monasteries) are illustrated. First, the transition process of the Bahā/Bahī from a place of learning for celibate monks to an ordinary residence for non-celibate monks is clarified. Second, a framework is developed to analyze the spatial structures of the present Bahā/Bahī, which was extracted from the spatial structure of typical Bahā/Bahī by examining the relationship between the courtyard's surrounding buildings and its accessibility. Lastly, the framework is applied to 65 exemplars of Bahā/Bahī in the old city area of Patan. As a result, 12 types of spatial structures were discovered, and the characteristics of the major types were determined.

Keywords
Buddhist monastery, courtyard, Nepal, Patan old city, settlement

1. Introduction

1.1 Background and purpose of research

Kathmandu Valley, the capital region of Nepal, has undergone significant urbanization in recent years [Note 1]. Three major cities exist in this valley, Kathmandu, Patan, and Bhaktapur (Figure 1), which developed as small countries of the Newār or Newāh (a group indigenous to the Kathmandu Valley) prior to the conquest of the valley that set the stage for the unification of Nepal by Prithvi Narayan Shah in 1769. Buddhist monasteries exist in the old city areas of these 3 cities [Note 2] (Figure 1), each of which is characterized by both Buddhist city elements [Note 3] and the habitats/residences of the Newārs. The typical architectural style of the Buddhist monastery is a courtyard style [Note 4], and generally the Newār family residence is a multistory building [Note 5]. In the old city area, many blocks were formed by multistory buildings that were built surrounding courtyard(s). The courtyards are connected either by a narrow street or a narrow

passage through the first floor of the building in a courtyard to access the adjacent courtyards. In this research, collectively the courtyard, the buildings surrounding the courtyard and the continuity of it is termed a "courtyard-style settlement."

Previous studies have indicated that during the medieval period, the residences of the Malla dynasty kings and other wealthy people were constructed following the architecture of a typical courtyard of a Buddhist monastery [Note 6]. Moreover, a morphological study speculated that courtyard-type blocks developed primarily around the Buddhist monasteries [Note 7]. For these reasons, the whole old city areas of the 3 cities mentioned above can be regarded as collectibles of the courtyards originating from Buddhist monasteries.

In Nepal, most of the courtyards are considered a public land; however, the local residents are responsible for the use, daily management, and maintenance of the courtyards [Note 8]. Moreover, management organizations such as "Sangha" and "Guthi" exist for the buildings of the Buddhist monastery surrounding the courtyard and the Buddhist monuments placed in the courtyard, respectively. The management and
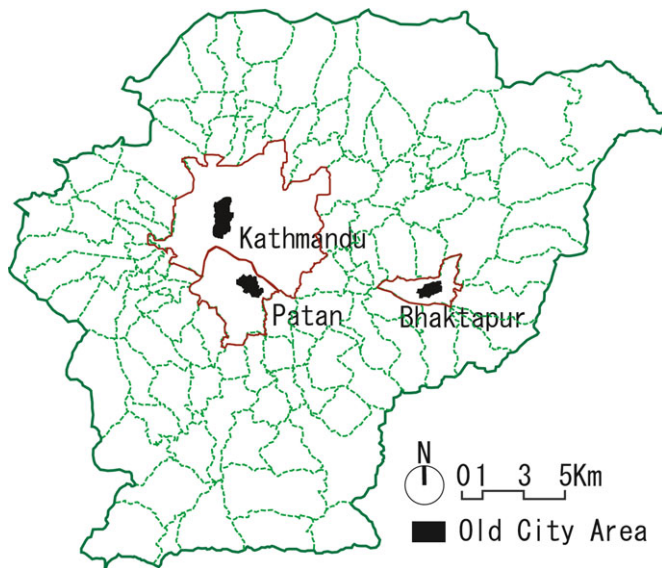
Figure 1. Kathmandu Valley and 3 old cities

maintenance is performed by the members of the corresponding organizations [Note 9]. However, with the recent progress of urbanization, the relationship between these management organizations and residents has been diluted primarily because of the commercial use of buildings in the courtyards that include Buddhist monastery buildings and increasing resident migration to the suburbs [Note 10]. In other words, the traditional cooperative space management system in the old city area is changing due to urbanization, and it has become increasingly important to reorganize the system to match the demands of the present age.

In Nepal, the Buddhist monastery is known as Bahā or Bahī [Note 11]. Courtyards other than the courtyard of the Bahā/Bahī exist in the old city area, and in many such courtyards, several Buddhist monuments called Chaitya are present [Note 12]. The courtyard is a sacred space where people conduct daily worship, and it is also an important living space used for a children's playground, discourse, laundry, etc [Note 13]. On the other hand, even if the courtyards are Bahā/Bahī, cases exist in which the use of the courtyard as a Buddhist monastery has decreased, and it has changed into a living space. Therefore, this paper clarifies the spatial structure of the courtyard-style settlement Baha/Bahı in the old city area as the fundamental research of the reorganization of this cooperative space management system to conform to the present age.

Specifically, the transformation process of the Bahā/Bahī from the Buddhist monastery, which functioned as the center of religious activities, to the contemporary courtyard-style settlement is first summarized. Then, after considering the method of spatial structure classification, this classification was applied to the actual courtyard-style settlement composed of the courtyards known as Bahā/Bahī located in the old city area of Patan, to reveal their spatial composition and characteristics. There are 166 Bahā/Bahī in the old city area of Patan, whereas there are 106 in Kathmandu and 23 in Bhaktapur [Note 14]. In addition, Patan was selected as the target site because urbanization there has not progressed as much as it has in Kathmandu but is considered as changing under the influence of urbanization.

1.2 Status of past research and the current research

Considering the Bahā/Bahī as a religious space, much research has been conducted from Buddhist and historical viewpoints to address religious activities and the managerial organization Sangha. Shakya[19] is one of the representative researchers, and Vajracharya[20] is conducting research specifically on the Bahā/Bahī in Patan. In addition, Shakya[4,5,21] translated ancient documents preserved in Tibet and China into Nepali and English and conducted in-detail research on the activities of medieval Buddhist scholars. Locke[18] presented the detailed history, managerial organizational form, and events of all of the Bahā/Bahī in Kathmandu Valley. Gellner[22] compared Buddhism and Hinduism based on the rituals performed in the Bahā/Bahī and further discussed the transition of Bahā/Bahī. Shakya[23] illustrated the building construction method of the Bahā/Bahī based on the historical literature.

On the other hand, the literature prepared by UNESCO and the Nepalese government,[24] which mentioned the Bahā/Bahī as a cultural heritage of the old city area has been the most valuable material. In a two-volume historical archive catalog (book), all temples and Buddhist monuments in the Kathmandu Valley, including the history of the Bahā/Bahī, photographs, and location maps are listed. Korn[7] introduced the architectural style of the Bahā/Bahī as one of the traditional buildings of the Kathmandu Valley, and based on its architectural spatial form, Bahā/Bahī are classified into 3 categories: Bahā, Bahī, and Bahābahī. The Nippon Institute of Technology Investigation Team[25] conducted an investigation on the restoration of one of the deteriorated Bahī in Patan, from pre-restoration to completion. The team classified Bahā and Bahī into 4 categories based on the planar form and investigated the architectural aspects of several Bahī. In addition, the team has conducted the transition of the planar form of the Buddhist monastery and its relationship with the palace architecture.[10] However, the Bahā/Bahī, which are attached to individual/private houses, have not been investigated or considered.

From the viewpoint of cultural anthropology, Ishii[26] investigated the old city area of Patan, emphasizing the city as a holy settlement composed of traditional Newār houses and religious spaces. In addition, Sharma's book of historical research,[27] argues that the land system of ancient time and the Newār settlement are inter-related; however, nothing was mentioned regarding courtyard-style settlements.

Pant et al.[28] conducted a study at Bu Bahā, one of the Bahā attached to the private residences. From their investigation of the area consisting of a sub-monastery in the courtyard residential block, they indicated that the spatial structure and relationship between the main monastery and sub-monastery of the Bahā played a decisive role. Furthermore, this research highlighted the possibility of the use of certain modules to determine the dimensions of the courtyard residential block.[12] In addition, case studies of Bahā/Bahī converted into individual houses have been reported in local architectural magazines; however, these studies are limited to survey reports.[29]

The current paper considers, Bahā/Bahī not only as a religious and historical space but also as an important living space that has changed over time. This study presents fundamental research to pursue knowledge about how the communal use and management of these settlements should be performed. In addition, the conservation of the Bahā/Bahī is also evaluated not only from religious and historical viewpoints but also from the viewpoint of a living space, and this research can be used to elucidate its contemporary significance.

1.3 Research methodology

Chapter 2 presents the transformation of Bahā/Bahī through literature reviews of the history of Buddhism and Bahā/Bahī; supplements and confirmations were conducted through interviews. Chapter 3 first considers the spatial characteristics of the Buddhist monastery Bahā/Bahī as close to the prototype based on the literature and then organizes the viewpoints concerning its categorization. Chapter 4 uses the aforementioned viewpoints, and based on a field survey of the old city of Patan, target cases are categorized and analyzed with regard to their respective characteristics. Chapter 5 summarizes the findings obtained from each chapter.

The interviews with experts in Chapter 3 and the field survey in Chapter 4 were conducted in April 2008, June 2009 and November 2009.

2. Transformation of courtyard-style settlement (Bahā/Bahī)

Bahā/Bahī is a Newāri word for a Sanskrit word "Vihār" (monastery) that has likely existed since the Buddha period to refer to the residential place for celibate monks. After the Buddha's death and to indicate the existence of Buddha, a Chaitya was established at the center surrounded by a monk room [Note 15]. In Nepal, the first monastery called Chā Bahī was established in the 3rd century [Note 16], due to a lack of evidence; however, the history of Nepal prior to the 4th century (ie, the Licchabi Period) has many uncertainties. For this reason, this chapter also concerns the changes that have occurred since the 4th century (Figure 2).

2.1 Bahā/Bahī from the 4th to 12th centuries

More than 15 Bahā/Bahī existed during the Licchabi period. During that time, government aid was provided to the Bahā/Bahī, which were treated as important institutions of the country [Note 17]. The Sangha organization of the Bahā/Bahī bestowed an autonomous right to the monks through which they also managed the donated land and monasteries. The period between the 8th and 12th centuries was the growth period of Buddhism. The number of monks who came to learn Buddhism from India and China increased and numerous Bahā/Bahī were founded; however, most of them were founded for the celibate monks [Note 18]. During the 12th century, the post of "Shākya" was given to celibate monks, and the post of "Bajrāchārya" was given to the non-celibate monks (ordained priests) [Note 19]. Until 12th century, the Bahā/Bahī were likely the exclusively dedicated residences of the celibate monks who studied mainstream Buddhism [Note 20].

2.2 Bahā/Bahī from the 13th to 15th centuries

During the Malla period in the 13th century, Buddhism was persecuted in India, and large numbers of Buddhist scholars entered Nepal with many documents related to Buddhist studies. During the division of the caste system in the 14th century, the monk posts "Shākya" and "Bajrāchārya" were also adopted as castes with a job entitled priest. From that point onwards, it became impossible for people from other castes to become monks in the Bahā/Bahī [Note 21]. By the end of the 15th century, celibate monks became obsolete, and only the descendants of the previous monks were allowed to practice as ascetics. In addition, the Sangha, a management organization of the Bahā/Bahī was converted into an organization based on the blood relationship. Ascetic practice was converted into a ritual known as Chudākarma [Note 22] in which one can

become a monk over 4 days, and the descendants of the monk automatically became eligible to perform this ritual. Ritual or ceremonial-based non-celibate monks (ordained priest) centered Newār Buddhism likely began at this time [Note 23].

2.3 Bahā/Bahī from the 16th to 18th centuries

By the end of the 15th century, the Kathmandu Valley was divided into several small countries, each with their own reformation structures. During the second half of the 17th century, the Bahā/Bahī was systematically divided into the main monastery and sub-monastery in Patan [Note 24]. The Bahā/Bahī that conducted the rituals related to ascetic practice were considered as the main monastery and called Mū Bahā/Mū Bahī, whereas others were considered as the sub-monastery of the corresponding main monastery and called Kachā Bahā/Kachā Bahī. Any Bahā/Bahī established thereafter became a sub-monastery belonging to the main monastery as a personal possession of an influential religious person. Bahā/Bahī were likely classified into the following 3 levels: (1) Mahā Vihār (High-ranked Monastery: Mū Bahā was the residence of the non-celibate monks [ordained priests] who completed ordinary ascetic practice and were devoted to advanced ascetic practice); (2) Madhyama Vihār (Intermediate ranked Monastery: Mū Bahī was the residence of celibate monks); and (3) Sāmānya Vihār (Ordinary Monastery: Kachā Bahā/Kachā Bahī were the residences of ordinary citizens practicing Buddhism) [Note 25]. By the 15th century, however, the original use of Mū Bahī as a monastery vanished due to the extinction of celibate monks, and most were converted into places for Buddhist studies and local elementary schools [Note 26]. Moreover, priesthood already existed in Hinduism. To secure a similar position, Bajrāchārya became technician in-charge of the rites of passage related to the lifecycle of Buddhists, and the Shākya were removed from ceremonial Buddhism and given new jobs [Note 27].

Given the above information, Mū Bahā/Mū Bahī transformed from the residences of academic-centered Buddhist monks to those of monks who performed rituals and lived similar to ordinary citizens, as well as the place where communal activities were conducted. Similarly, most of the Kachā Bahā/Kachā Bahī were places that emphasized a normal lifestyle but were not the primary place to conduct rituals from the beginning.

Because many Kachā Bahā/Kachā Bahī were founded during the 17th century, the Bahā/Bahī were likely placed in the form of courtyard-style settlements focused on the lifestyles of normal citizens rather than those of monks by the time of establishment [Note 28].

2.4 Bahā/Bahī from the 19th century to the present

During the latter half of the 18th century, Nepal, which had been divided into several small countries, was unified by the Shāha dynasty of non-Newār tribes, and the Kathmandu Valley was declared as the new capital of the country. To keep up with the changes that occurred in society due to the increased number of immigrants from outside Kathmandu, efforts were made to review the Newār Buddhism that was inherited from the non-celibate monks who continued the rituals but lived a normal civic life. In 1926, the Newār people who were interested in Tibetan Buddhism become celibate monks for the first time [Note 29]. In addition, monks of Theravāda Buddhism, which was prosperous in Southeast Asia, appeared in 1930. In 1943, the Buddhist Society of Nepal (an organization of Theravāda monks not related to the traditional Baha/Bahi system) was established, and the first Theravāda Buddhist monastery ("Vihār") was built in 1944 [Note 30]. In the existing Mū
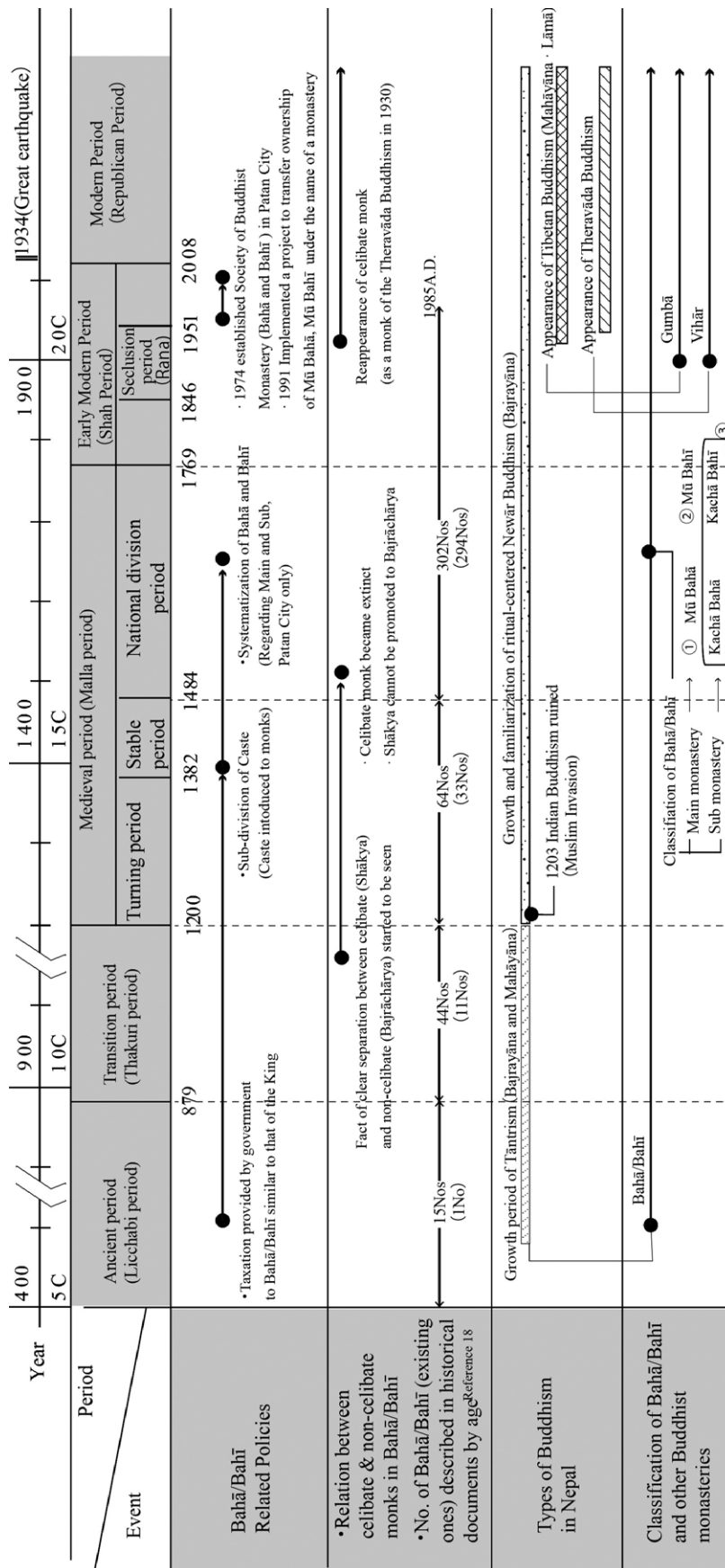
Figure 2. Historical background and the transition of the courtyard-style settlement "Bahā/Bahī" in Kathmandu Valley (old Nepal); this figure was created by the author based on the literature review and interviews

Bahī, some cases of lending a part of the Mū Bahī free of charge existed, and full ownership was even transferred to a Theravāda Buddhist monk [Note 31]. From that time onwards, almost no new Bahā/Bahī were established [Note 32]; however, the construction of "Vihār" became prominent after the 20th century [Note 33]. Furthermore, some examples of Bahā/Bahī appeared in which except the "Gandakuti" portion (ie, the main room of the Bahā/Bahī where Buddhist deities are placed) other remaining living spaces were privatized, and proper management was not performed. Concerning the annihilation of the Buddhist monastery Bahā/Bahī, the Society of Buddhist Monasteries (Baudha Bihar Sangha) was established in Patan in 1974, and this society successfully completed the task of transferring back the ownership of the Bahā/Bahī in Patan in 1991 from the individuals of Sangha to the Sangha organization itself. However, this ownership transmission issue remained unchanged in the case of Bahā/Bahī whose number of Sangha members is decreasing [Note 34].

3. Spatial characteristics of the Bahā/Bahī as a Buddhist monastery and the viewpoints regarding its classification

This chapter presents the viewpoints regarding the classification of Bahā/Bahī based on the spatial characteristics of the courtyard-style settlement.

3.1 Bahā/Bahī close to Buddhist monastery prototype
During the medieval period, planning methods such as site determination and the location of the Gandakuti within the

monastery were established for the Bahā and Bahī styles [Note 35]. Of the existing Bahā/Bahī, Chhusyā Bahā (one of the Kachā Bahā in Kathmandu) and Pintu Bahī (one of the Mū Bahī in Patan) (Figure 3), were the monasteries constructed according to the planning methods of the medieval period [Note 36]. Both Bahā and Bahī are monolithic two-story buildings constructed surrounding a courtyard. Upon observing the space distribution inside the building, the "Gandakuti" (hereinafter "G") is located on the first floor in front of the entrance of the courtyard and a prayer/chanting chamber "Āgam" (hereinafter "A") is located on the second floor. An assembly room "Digi" (hereinafter "D") is placed outside of "A" and the remaining spaces are used as rooms for the monks and multi-purposes rooms. Of all of the spaces, "G" is the most important space in the Buddhist monastery. In addition, a "Chaitya" (Stupa) (hereinafter "CH") is mandatory for the courtyard of a Buddhist monastery.

Based on the above description, a monastery building that is close to its prototype contains a basic configuration with G and courtyard with CH that includes other various spaces to fulfill the requirements for the Buddhist monastery shown in Figure 4.

3.2 A viewpoint regarding the categorization of a courtyard-style settlement (Bahā/Bahī)
During the medieval period, in Baha/Bahi close to the prototype, the courtyard and the building surrounding the courtyard were used only by the monastery. However, extant Bahā/Bahī includes (1) the one closer to the prototype, (2) the one that has another monastery affiliated building attached to the
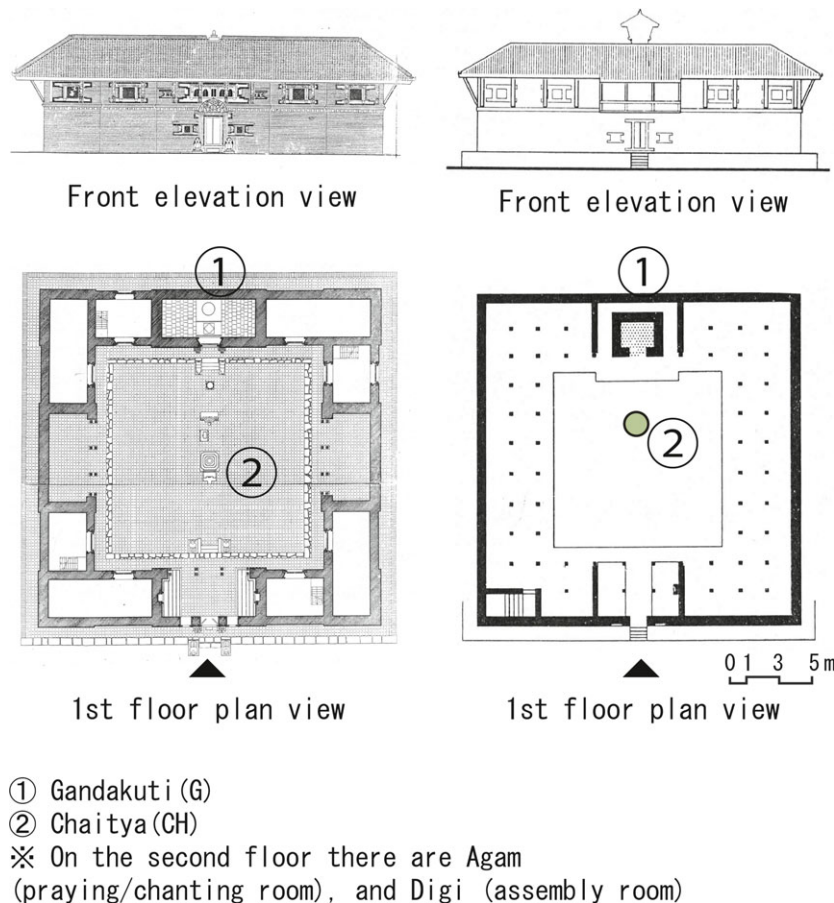

Front elevation view | Front elevation view
① | ①
② | ②
1st floor plan view | 1st floor plan view
0 1   3   5m

① Gandakuti (G)
② Chaitya (CH)
※ On the second floor there are Agam
(praying/chanting room), and Digi (assembly room)

Figure 3. Plan and elevation of the Bahā/Bahī close to the prototype (Left: Chhusyā Bahā, Right: Pintu Bahī. Drawings © 1977 Ratna Pustak Bhandar.[7] Reprinted by permission.)
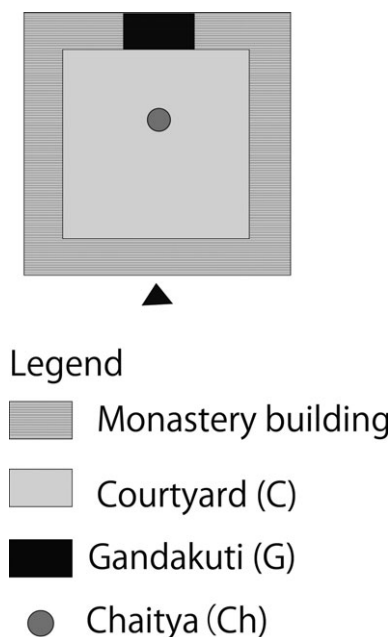
Legend
▦ Monastery building
▢ Courtyard (C)
■ Gandakuti (G)
● Chaitya (Ch)

Figure 4. Spatial characteristic of the Bahā/Bahī close to the prototype

monastery building with "G" and (3) a "G" located in the courtyard, and the courtyard is surrounded by normal residential buildings and not by monastery [Note 37]. Upon comparing the spatial characteristics of the Bahā/Bahī constructed during medieval period that were closer to the prototype than the extant Bahā/Bahī, the relationship between the courtyard and the enclosure shape of the surrounding buildings has gradually changed.

Regarding the spatial characteristics of the extant Bahā/Bahī and the enclosure shape of the surrounding monastery building, Bahā/Bahī can be classified into (1) a completely surrounded type, (2) a partially surrounded type, and (3) a not-surrounded type (see Figure 5).

In addition, in the Bahā/Bahī that are closer to the prototype, the door is existed at the entrance of the courtyard, and the access to the Bahā/Bahī is controlled during certain times of the day to hinder people from freely entering the inside of the monastery. Currently, however, many courtyards exist with multiple entrances without door through which people can freely enter and pass through the courtyard at any time. The courtyards that can be freely accessed emerged with a continuum between the courtyard that includes the peripheral area and the city. This characteristic contradicts the independent Buddhist monastery's courtyards where passing through is not possible.

Therefore, depending on the current spatial characteristics of the Bahā/Bahī (ie, whether they can be accessed freely and whether it is possible to pass through them), the "courtyard-style settlements" were categorized as (1) Pass through possible with non-controlled access; (2) Pass through possible with controlled access; (3) Pass through not possible with non-controlled access; and (4) Pass through not possible with controlled access. These categories are shown in Figure 6.

4. Spatial structure and characteristics of the courtyard-style settlements (Bahā/Bahī)

Based on the field survey of the Bahā/Bahī and the viewpoints presented in Chapter 3, this chapter analyzes the classification and characteristics of the courtyard-style settlements.

4.1 Outline of the courtyard-style settlements (Bahā/Bahī)
A total of 166 Bahā/Bahī are located in Patan's old city area. Of these Bahā/Bahī, 16 are Mū Bahā of high-ranked main monasteries, 21 are Mū Bahī of intermediate ranked main monasteries [Note 38], 105 are Kachā Bahā and 10 are Kachā Bahī of low-ranked sub-monasteries including other 14. First, the Bahā/Bahī, Mū Bahā (BA) and Mū Bahī (BI) whose spatial characteristics were relatively close to the prototype Buddhist monastery were selected to conduct an analysis. To compare their spatial characteristics, all 28 Kachā Bahā (KB) associated with one of the Mū Bahā (Kwā Bahā) were selected for the analysis. Figure 7 shows the distribution of Bahā/Bahī in the old city area of Patan.

4.2 Classification of courtyard-style settlement (Bahā/Bahī)
The field survey confirmed the following aspects with local residents: (1) whether the courtyards can be passed through, (2) the enclosure shape of the monastery buildings surrounding the courtyards, and (3) whether the access is controlled. Regarding the enclosure shape of the surrounding monastery buildings, when a monastery building was sandwiched between 2 courtyards, the location of the main entrance of the building was used to determine to which courtyard the building belonged. If the courtyard had 2 or more entrances, then passing through was considered as possible. Furthermore, the courtyard was
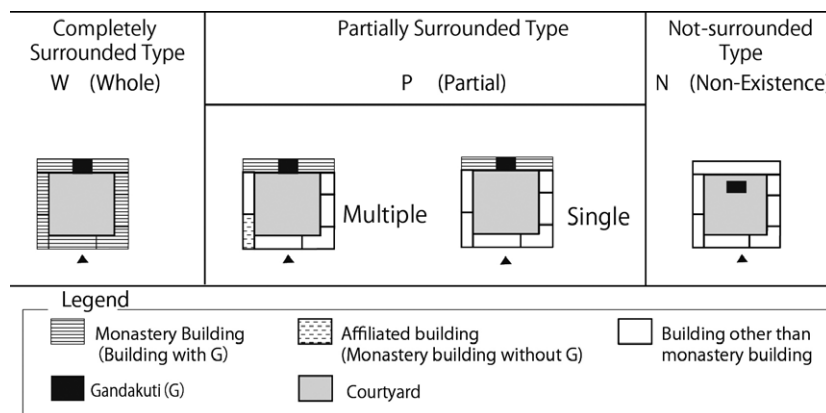

Figure 5. Categorization based on the enclosure shape of the surrounding building of the courtyard

Figure 6.   Categorization based on the possibility of passing through and access control

judged to be access-controlled if a door was present at the entrances, and the access was controlled during certain times of the day. The results are shown in Table 1 and Figure 8.

Of all of the considered cases, 2 special cases exist (S.N. 36, 37 and S.N. 56, 57 in Table 1) in which 2 Buddhist

monasteries (Bahā/Bahī) were located in the same courtyard. These 2 cases were excluded from this study, and the analysis was conducted on a total of 61 cases.

Based on the enclosure shape of the surrounding monastery building, all 61 cases are classified into the following types: 16
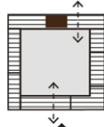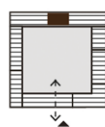

Figure 7.   Distribution of the courtyard-style settlement (Bahā/Bahī) in Patan; this figure was created by the author based on a digital map from Department of Urban Development & Building Construction, Government of Nepal, and the information about the monastery was written based on references 18 and 24)
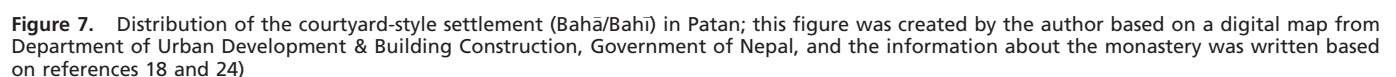
Table 1. Attribute list of the case studies
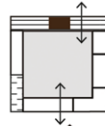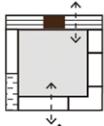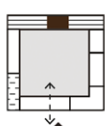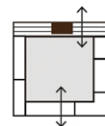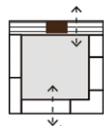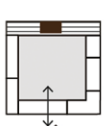
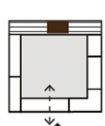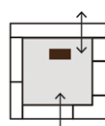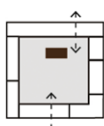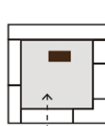| S. no.	Name of Bahā/Bahī		First year with records (Nepal Era)	Courtyard size		Monastery building surrounding courtyard	Courtyard		Classi fication
				Area	m × m		Passing throuh possibility	Access Control	
1	Kwā Bahā	BA1	165	106	10.7 × 9.9	Completely Surrounded	Yes	*	i
2	Uku Bahā	BA8	239	159	12.4 × 12.8			*	
3	Guji Bahā	BA9	373	100	9.6 × 10.4			*	
4	Ha Bahā	BA14	262	178	13.4 × 13.3			*	
5	Jyabā Bahī	BI7	772	99	9.4 × 10.5			*	
6	Ibā Bahī	BI8	537	196	14.7 × 13.3			*	
7	Ikhāche Bahī, Pintu	BI14	511	71	8.5 × 8.4				
8	Konti Bahī	BI16	743	145	9.8 × 14.8			*	
9	I Bahī	BI18	470	104	9.4 × 11.1			*	
10	Chika Bahī	BI19	535	209	14.0 × 14.9				
11	Ilāye Bahī	BI4	Unknown	164	11.0 × 14.9		No	*	ii
12	Kinu Bahī	BI9	539	70	8.7 × 8.1				
13	Nhyakā Bahī	BI10	727	95	9.4 × 10.1				
14	Na Bahī	BI13	778	97	9.9 × 9.8				
15	Ikhāche Bahī, Dantu	BI15	Unknown	NA	NA				
16	Pucho Bahī, Chwathu	BI20	372	197	13.7 × 14.4				
17	Wam Bahā	BA3	561	243	15.9 × 15.3	Partially Surrounded Multiple	Yes		iii
18	Jyo Bahā	BA4	Unknown	71	8.5 × 8.3				
19	Ta Bahā	BA12	547	4282	79.0 × 54.2				
20	Bu Bahā	BA15	547	1840	58.6 × 31.4			*	iv
21	Guita Bahī, Mula	BI1	144	293	12.4 × 23.6			*	
22	Guita Bahī, Tadhagu	BI2	144	92	10.0 × 9.2			*	
23	Guita Bahī, Chidhagu	BI3	144	91	10.2 × 8.9			*	
24	Dhapagā Bahī	BI17	795	165	13.2 × 12.5			*	
25	Tanga Bahā	BA10	245	1012	35.5 × 28.5		No	*	v
26	Nāg Bahā	KB2	577	3865	69.9 × 55.3	Partially Surrounded Single	Yes		vi
27	Aki Bahā	KB10	656	NA	NA				
28	Mikhā Bahā	KB12	832	164	12.9 × 12.7				
29	Yekhāchhen Bahā	KB19	**1969	NA	NA				
30	Dhum Bahā	BA3	805	48	7.1 × 6.8			*	
32	Yachu Bahā	BA5	744	NA	NA				
31	Su Bahā	BA6	182	126	12.1 × 10.4			*	
33	Bhinchhe Bahā	BA7	550	305	16.4 × 18.6			*	vii
34	Cuka Bahā	BA11	780	107	10.3 × 10.4			*	
35	Si Bahā	BA16	509	86	9.0 × 9.6			*	
36	Michu Bahā	KB3	※807	1720	46.6 × 36.9			*	
37	Baidhya Bahā	KB4	Unknown	1720	46.6 × 36.9			*	
38	Nhu Bahā	KB7	457	112	10.1 × 11.1			*	
39	Bahāchā	KB17	779	23	4.5 × 5.2				
40	Harsa Bahā	KB26	※977	58	7.5 × 7.7				
41	Kwalim Bahā	KB6	Unknown	NA	NA		No		viii
42	Dau Bahā	BA13	706	131	12.0 × 10.9			*	
43	Ubahā Bahī	BI5	511	120	8.6 × 14.0			*	
44	Thapā Bahī	BI6	**1911	NA	NA			*	
45	Khwāye Bahī, Tadhagu	BI11	734	NA	NA			*	
46	Khwāye Bahī, Chidhagu	BI12	Unknown	NA	NA				ix
47	Pucho Bahī, Kwathu	BI21	672	103	10.8 × 9.5			*	
48	Ikhāchhen Bahā	KB1	535	107	10.3 × 10.4			*	
49	Atha Bahā	KB8	842	66	7.5 × 8.8			*	
50	Yata Bahā	KB11	814	174	13.4 × 13.0			*	
51	Mu Bahā	KB13	567	146	12.5 × 11.7			*	
52	Chhāye Bahā	KB14	787	116	9.6 × 12.1			*	
53	Āna Bahā	KB15	535	105	10.7 × 10.1			*	
54	Mati Bahā	KB23	**1934	22	4.1 × 5.3				
55	Triratna Sim Bahā	KB25	974	42	7.4 × 5.7			*	
56	Nyākhāchuka	KB9	520	3582	60.5 × 59.2	Not Surrounded	Yes		x
57	Unaca Bhājubal Bahā	KB16	Unknown	3582	60.5 × 59.2				
58	Ganesa Bahā	KB18	1054	149	16.4 × 9.1				
59	Chādwa—Bakunani	KB28	1065	NA	NA			*	
60	Sasu Nani	KB5	845	377	16.6 × 22.7			*	xi
61	Kuti Bahā	KB20	930	24	5.2 × 4.6			*	
62	Khāchhen Bahā	KB21	**20century	NA	NA		No		
63	Thyākā Bahā	KB22	※920	32	6.8 × 4.7				xii
64	Mati Bahācha	KB24	983	NA	NA				
65	Dhandya Bahā	KB27	1006	NA	NA				

① All the Bahā/Bahī have Sanskrit name, but here Newār name which is well known to the locals, are used. (See Reference 18)。

② The "first year with records" is mentioned as reference information based on the literatures: Years with ※ mark are from reference 24 and others are taken from reference 18. The year mentioned in Nepal Era (NS Newär era) beg in October 879 AD, but the one with ** is in AD.

③ Size of courtyard: Areas are measured from digital map of Dept. of Survey, Nepal. "NA" indicates that surrounding building of courtyard has collapsed and due to vacant lot & reconstruction work area of courtyard cannot be specified.

④ * : controlled in night. or closed except there is any activity

Figure 8. Classification of courtyard-style settlement (Bahā/Bahī)

cases were of the completely surrounded type, 9 cases were of the partially surrounded type with multiple monastery buildings, 28 cases were of the partially surrounded type with single monastery building, and 8 cases were of the not-surrounded type. Many partially surrounded type courtyards were found compared with the other types. Completely surrounded and multiple partially surrounded types were composed of main monasteries "BA" and "BI." The not-surrounded type was limited to the sub-monasteries "KB" whereas a single partially surrounded type was composed of all types of monasteries: "BA," "BI", and "KB."

Based on the survey, upon observing the possibility of passing through via the courtyards and the presence of an access-control system during certain times of the day, people were able to pass through the courtyard to access to surrounding urban areas in 35 of the 61 cases and access was controlled during certain times of the day in 52 cases. Regardless of the possibility of passing through via courtyards, many cases existed where the access to the courtyard was controlled.

The spatial structure types (type i-xii) of the courtyards and their corresponding areas are plotted in Figure 9. Because type i and ii courtyards are composed of "BA" and "BI" and are completely surrounded type courtyards, the area of these courtyards ranged from 70 to 200 m². On the other hand, the large-scale courtyards of cases 19 and 26 had areas approximately 4000 m² and are the

courtyards that can be passed through where access is not controlled, belonging to spatial structure types iii and vi. The courtyard of case 20 had area of approximately 2000 m² and could be passed through; however, access was controlled at night. The number of users of the large-scale courtyards was high and more commonly used; as a result, it is difficult to control the access at night. The small-scale courtyards of cases 39, 54, 61, and 63 have areas of approximately 30 m² and belong to spatial structure types vii, ix, xi, and xii, respectively. All of these cases are composed of KB. Their access was usually controlled in spatial structure types vii, ix, and xi.

4.3 Spatial structure type: Enclosure shape with surrounding monastery buildings and its characteristics

During the field survey, an interview regarding the controlled access times for each case was conducted. Primarily, 2 types of access controls were confirmed. In the first, access is controlled only at night and in the second, the entrance is usually closed at all times and only specific people are allowed to enter and leave. The extant access-control type is listed for all cases under the column "Access Control" in Table 1. This section presents the aforementioned access-control system via an analysis of the spatial characteristics of the enclosure shape of each surrounding monastery building.
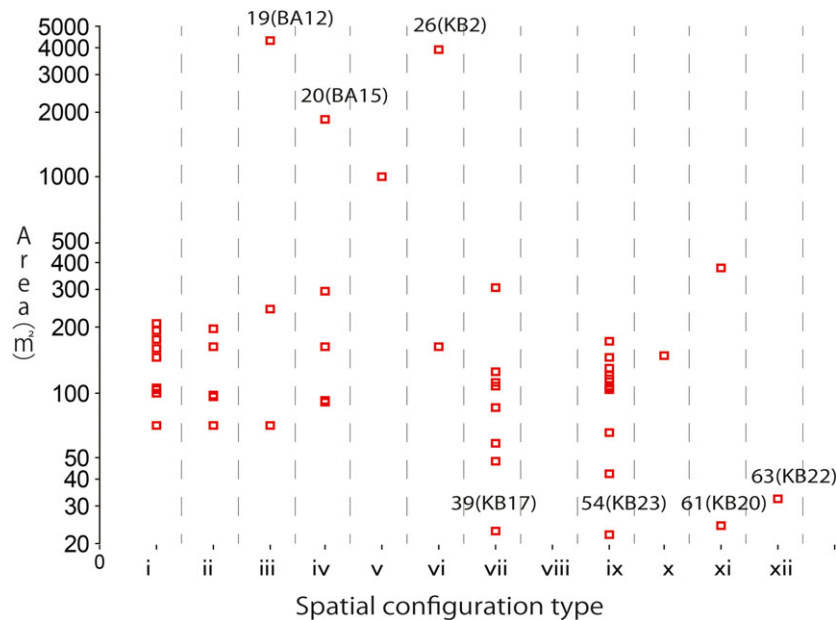
Figure 9. Relationship between spatial structure type and the width of the courtyard

4.3.1 "Completely surrounded" type: A courtyard completely surrounded by the monastery building

Courtyard structure types i and ii are both entirely surrounded by monastery buildings and access to these courtyards is controlled. No passage exists to move through in type ii courtyards, and the spatial structures of these courtyards are similar to those of the Bahā/Bahī prototype mentioned in section 3.1. Six numbers of type ii courtyards exist, and 10 numbers of type i courtyards exist. Access is controlled all of the time in most type ii courtyards; however, access is controlled only at night in the case of type i courtyards, and people can freely pass through during the day.

4.3.2 "Partially surrounded" type: A courtyard partially surrounded by monastery buildings

The courtyards that are partially surrounded by monastery buildings are divided into 2 types: a courtyard in which the monastery building exists only at one location of the courtyard ("single partially surrounded" type) and a courtyard in which the monastery buildings exist in multiple locations inside the courtyard ("-tiple partially surrounded" type). Types iii-v are "multiple partially surrounded" type. Eight courtyards were classified as type iii and iv, where passing through is possible. Only 1 type v courtyard existed, where people cannot pass through. Access was controlled in all 5 type iv courtyards and 1 type v courtyard, but access was controlled at night for all of them.

A total of 28 courtyards of type vi-ix were assigned to the "single partially surrounded" type, which includes the most courtyards. Passing through via the courtyards was possible in 13 cases, whereas passing through was not possible in 15 cases. Thus, the number of courtyards through which passing through is possible or not approximately the same. Access was not controlled in only 5 cases, whereas access was controlled in 23 cases. In all 14 type ix cases, passing through was not possible, and access was controlled. In most access-controlled courtyards of types vii and ix, access was controlled only at night.

Other than the monastery buildings, many of the buildings in the courtyard were normal residential buildings. Because the

courtyard can be used by both the monastery and the local residents for various purposes, regardless of the possibility of passing through the courtyard, the courtyard can be used by anyone during the day.

On the other hand, access used to be controlled at night to prevent Buddhist statues, ornaments and other monuments from theft, primarily with regard to the completely surrounded type main monasteries ("BA," "BI"). During the survey, access control at night was observed, even for most of the partially surrounded type courtyards and not-surrounded type courtyards. The interview revealed that the reason behind adopting this action was to prevent crime in the living space caused by the migration of a large population due to rapid urbanization.

4.3.3 "Not-surrounded" type: A courtyard without monastery building

Types x-xii are "not-surrounded" type courtyards. Passing through the courtyard was possible in 4 cases of types x and xi, whereas passing through the courtyard was not possible in 4 cases of type xii. Access was not controlled in only 1 type x courtyard. There exist 3 numbers of type xi courtyards and 4 numbers of type xii courtyards. In addition, night access was controlled for all 3 type xi courtyards. Access was controlled all the time for all 4 type xii courtyards. Because the courtyards of type xii were relatively small and composed of only 1 or 2 residential buildings, these courtyards are used as private property. All 8 "not-surrounded" type courtyards of x-xii are the sub-monasteries "KB." These buildings are used as residence rather monastery buildings; hence, access is controlled accordingly.

4.4 Case study of the courtyards that are possible to pass through with controlled access

An additional interview was conducted with regard to the constantly access-controlled courtyards through which people can pass to the peripheral urban area. Then, the relationship between the spatial use and its control was examined (Figure 10).
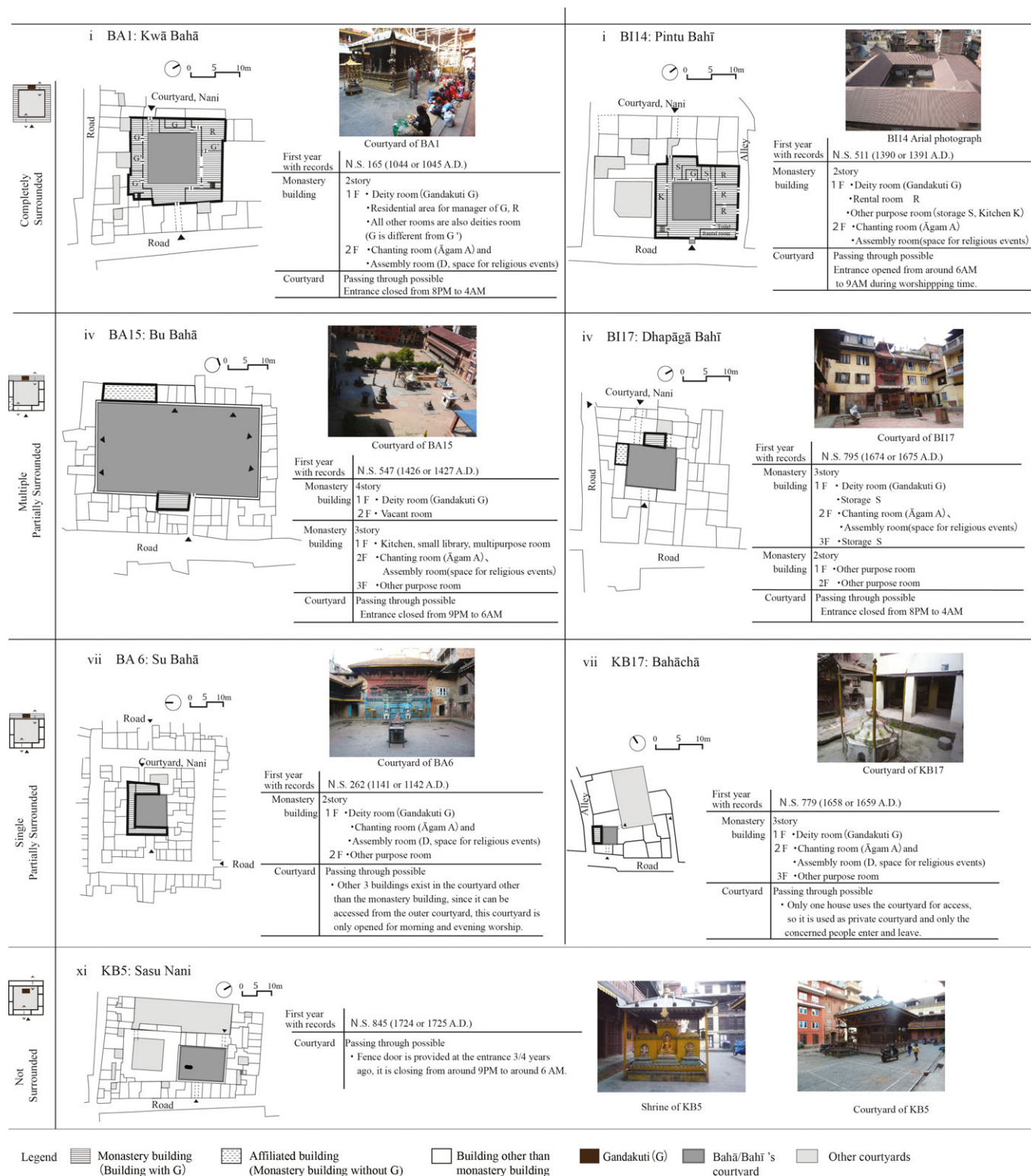
Figure 10. Spatial characteristics of the spatial structure type "pass through possible and controlled access" observed in the case study

4.4.1 Courtyards completely surrounded by monastery buildings (type i)

The monastery of case "BA1" has inherited the most traditional rituals in the Kathmandu Valley. On the first floor, in addition to "G" and other worship spaces for many deities, sleeping space for the manager of "G" [Note 39] is also arranged. On the second floor, in addition to enshrining various deities, a "D" exists where assemblies and dinner sessions are held after religious ceremonies. Moreover, the front of the monastery face toward the road, and another courtyard is located at the back. Everyday many people come to make pilgrimages and pass through the courtyard, especially because

many deities are enshrined in this 1 monastery, and there are monasteries in other connected courtyards. The entrances are open from 4 AM to 8 PM for pilgrims.

In case "BI14," excluding "G" of first floor and "A" in the second floor, is used as "D," and a part of the first floor is used as a rental room that has become a source of income for the monastery. The "D" space of the second floor is also used as a multipurpose space for community activities but requires approval from the Sanga organization. One can go to another courtyard from the back door of the courtyard. The back door is opened every day during the morning and evening for worshipers. For other times, only Sangha and other authorized members can enter and leave. Access to both of these cases is controlled depending on the commuting worshipers to the monasteries.

4.4.2 Courtyards partially surrounded by monastery buildings (types iv and vii)

Case "BA15" is composed of a courtyard and a monastery building, a building affiliated with the monastery, and residential buildings. There is a "G" in the monastery building, and excluding this "G," no other rooms are in use. Rather, "A" and "D" are located in the attached building affiliated with the monastery. "D" is not only used by Sanga as a religious space but also as a library and a meeting place by a group of local residents. The courtyard of "BA15" is large, and it is possible to pass through from 6 different locations of the courtyard to several small courtyards. In addition, all of the entrances and exits of the courtyard are locked from 9 PM to 6 AM, and the duty of locking the doors is assigned to each residential household in circulation.

Case "BI17" is an example where, except for the monastery building consisting of "G" (a building affiliated with the Buddhist monastery that has multipurpose rooms and residential buildings), a building of Theravāda Buddhism also exists. The monastery building is only available for Sangha members. On the other hand, the affiliated building is used for community activities such as women's association meetings and small-scale financial group (Sahakāri) meetings. Moreover, the courtyard is attached to other courtyards in 2 directions, and passing through is possible. Similar to the previous example, the doors of the entrances are locked by the residential households.

In case "BA6," 1 of 4 sides of the courtyard is a residential building, and it is a monastery building that was partially converted into a residence building. In the monastery building, G, A, and D are located on the first floor, and the multipurpose rooms are located on the second floor. Because these residential building can be accessed from the outside, the courtyard is opened only during daily worship.

Case "KB17" is also surrounded by 3 residential buildings and a monastery building. Two of these residential buildings are accessible from the road side; thus, the courtyard is the private property of 1 residence. In addition, only the resident of that building engages in daily worship. Hence, it is necessary to ask the residents to enter the courtyard and the monastery building.

4.4.3 Courtyards not surrounded by monastery buildings (type xi)

Case "KB5" is a medium-sized courtyard, surrounded by residential buildings and a part of the adjacent Mū Bahā. In this case, "G" is the shrine with the statue of Buddha located at the southeast of the courtyard. Rituals other than G's anniversary festival are not held. Although it is not obligatory, the

residents of the courtyard perform daily visits to the shrine. People can pass through via this courtyard to an adjacent courtyard and the road; however, recently a gate was installed at the entrance, and it is closed at night.

5. Conclusions

This paper revealed the spatial characteristics of courtyard-style settlements originating from a Buddhist monastery. First, based on the historical background, the transition of the Bahā/Bahī was organized as follows. During the 8th-12th centuries, the Bahā/Bahī was a residence for academically oriented celibate monks; during the 13th-15th centuries; however, it changed to a residence for ritual-centered non-celibate monks. During the 16th-18th centuries, in addition to being a residence for ritual-centered non-celibate monks, it served as a place for individuals to express their Buddhist faith. Furthermore, the Bahā/Bahī, which became the residence of celibate monks, also functioned as a local communal space. After new developments during 19th century, an academically focused environment consisting of academic-centered celibate monks was partially established under the influence of Theravāda Buddhism and Tibetan Buddhism. Furthermore, the ownership of certain Bahā/Bahī in Patan were returned to the Sangha organization of the Bahā/Bahī that had been privatized due to modernization and used as the residences of the general public. In addition, the Bahā/Bahī are used as commercial spaces and some deteriorated after their abandonment. Through this transitions, the existing Bahā/Bahī, which possess different features than those of the original monastery, were established as unique living spaces in the old city area.

Then, this paper confirmed 12 types of spatial structure of courtyard-style settlement (Bahā/Bahī) and their characteristics were clarified based on the enclosure shapes of the monastery buildings surrounding the courtyard, the possibility of passing through via the courtyard, and existence of controlled access.

1. Based on the enclosure shape of the Buddhist monastery surrounding the courtyard, courtyard-style settlements were divided into 4 types: the "completely surrounded type," the "multiple partially surrounded type," the "single partially surrounded type", and the "not-surrounded type." In addition, these structures were classified depending on whether it is possible to pass through via the courtyard and whether access to the courtyard was controlled. As such, the courtyard-style settlements were categorized into 12 types. The results of this classification revealed that among the main monasteries ("BA" and "BI"), fewer than half (16 out of 37) were the "completely surrounded type." In addition to the main monasteries, 115 sub-monasteries (Kachā Bahā/Kachā Bahī) are located in old city area. It can be inferred that only few of these sub-monasteries are the "completely surrounded type," and many Bahā/Bahī are either the "partially surrounded type" or the "not-surrounded type" courtyard-style settlements.

2. It was confirmed that many courtyards can be passed through (ie, courtyard-style settlements exist that have passages that connect to urban areas). Fewer cases of Buddhist monasteries exist as independent facilities. Although many courtyard-style settlements which can be passed through, access to these courtyards is often controlled depending on the time of the day via cooperative management.

3. From the detailed individual investigation, the actual condition of the spatial use and control system in the courtyard-

style settlement was determined. In the case of the "completely surrounded type" courtyards, Sangha controls the courtyard and it is used primarily for centralized ceremonial activities. In the case of the "partially surrounded type" courtyards, the courtyards are controlled by the local residents and used as living space in addition to a ceremonial space. In the case of the "not-surrounded type" courtyards, the courtyards are controlled by the local residents and are used as a living space and not as a ceremonial space.

4. Even when the courtyard was a "partially surrounded type" and the residents did not use the courtyard to access their homes, Sangha controlled the courtyard and used it as a ceremonial space. In addition, because few households have entrances on the courtyard side of small-scale "partially surrounded type" courtyards, local residents controlled the courtyard and used it as a private living space.

5. In terms of controlled access, of the entrances to the courtyards have recently tended to be closed at night to prevent not only theft of Buddha statues and fixtures/ornaments at the monasteries but also crime in the living space.

Based on the above conclusions, the transition of the courtyard-style settlements originating from the Buddhist monastery and the space composition of the existing courtyard-style settlements (Bahā/Bahī) were categorized, and their characteristics were clarified. Specifically, the space used as a Buddhist monastery and that used as an urban residence are in mixed condition. The degree of overlap between these 2 spaces differs across cases. Further investigations of this cooperative space management system should examine the system with regard to each characteristic.

Acknowledgments

Disclosure

The authors have no conflict of interest to declare.

Notes

Note 1) The population of Kathmandu Valley city was 995 966 as of 2001, accounting for 60% of the population in the entire valley, and this figure has increased at a rate of 5.22% every year.[1]

Note 2) Kathmandu, Patan, and Bhaktapur were 3 small countries during the medieval period; each country was independent and surrounded by city walls. Currently, these aforementioned small countries are known as the old city area of each city. City planning is conducted considering these old city areas (see references 2 and 3).

Note 3) Kathmandu Valley, in particular the Patan, was an educational base of Buddhist studies where students from Tibet and leaders from India gathered in the 8th to 13th centuries and was developed as Vast University City (see references 4-6). In addition, the survival of Buddhist monasteries, stupas as well as Mahāyāna Buddhism as a living tradition despite the conflict with non-Buddhist rivals, suggests that the city has developed as a Buddhist city (see reference 6, page 270).

Note 4) For the archetype architectural style of Buddhist monasteries, see pp. 25-37 of reference 7.

Note 5) Multistory buildings are dwellings of 4-5 stories that contain the living style of the Newār residence. Regardless of the size of the residence, the Newār residence is characterized per floor such that a toilet and storage area are on the first floor, a bedroom and reception room are on the second floor, a workplace is on the third floor, a kitchen, a dining room and a prayer room are on the fourth floor. Although the structure and appearance has changed due to modernization, the Newār residence style is inherited (see references 7-9).

Note 6) For the references of courtyards related to the architecture of the royal palace, see references 10 and 11. For the references of the courtyards related to the residence of wealthy people, see reference 8.

Note 7) See pp. 98-117 of reference 12.

Note 8) See reference 13.

Note 9) Sangha is a management organization of Buddhist monasteries consisting of trained celibate monks. Currently, celibate monks do not exist; however, the customs of ascetic practice remain. Hence, upon enrolling in Sangha, one must not only engage in the joint management of monasteries but also participate in organizing social ceremonies (marriages, funerals, and so on). The Guthī is a Newār traditional socio-religious organization that is established for each artifact or event by a related community to sustain the artifact or event (temples, monasteries, and ritual events). Each Guthī owns land that provides a source of income to fulfill the expenses of the management. The Guthī is formed by people who live in the area (territorial community), have clan relationships or membership in a religious association. Obligation to the organization is handed down by family tradition (hereditary system), so the organization was sustained from the time when the particular space or artifact was established or the activity began. The main body of Sangha consists of a jury of monks, and several Guthīs perform corresponding rituals in Sangha (see pp. 231-250 of reference 14).

Note 10) In the core area of the old city area of Kathmandu, Monastery buildings have been converted into general shops and restaurants. The courtyard spaces are often used as a parking lot, and many people do not know that they are historical Buddhist monasteries. Reference 15 states that these locations have completely changed appearances.

Note 11) In reference 7, based on the architectural style, Bahā/Bahī are classified into 3 types ([1] Bahā, [2] Bahī, and [3] Bahā/Bahī, which includes both aspects of Bahā and Bahī). In this study, however, the Bahā/Bahī are classified into Bahā or Bahī based on the concept of Buddhist monasteries regarding the management of the monasteries and the conducted rituals including the widely known viewpoints of the local area.

Note 12) Chaitya is generally translated as Stupā, and the Chaityas range from bigger to smaller sizes at the site; 1800 Chaityas exist in Kathmandu Valley (see reference 16).

Note 13) A small scaled courtyard or space called a "Sāgā" also existed that functioned as a common garbage dump site; recently, however, in the urban areas the common garbage dump site is no longer needed and instead of calling it a "Sāgā," it is now called a "Chuka," similar to other normal courtyards. However, "Sāgā" still exist in the rural settlements of the Newār indigenous group in the valley (p. 87 of the reference 17, the courtyard and the squares are mentioned but the term "Sāgā" is used for a garbage dumping site).

Note 14) The number of Bahā/Bahī in each old city area is based on reference 18. Bahā/Bahī also exist that are located away from the old city area; however, the administration treats the Bahā/Bahī in a comprehensive manner during ceremonies, which is likely preferable to consider the Bahā/Bahī outside of the old city area. Thus, this study included 2 Bahī situated outside of the old city area.

Note 15) Reference 23 uses Ajantā cave in India and Vihāra in Taxashilā as examples.

Note 16) Chābahī is currently located in Kathmandu, but it was likely rebuilt from the original, which was built in 1654. Reference 10 explains the architectural style of Chābahī.

Note 17) See p. 18 of references 30 and 32.

Note 18) See p. 385 of reference 31.

Note 19) See p. 20 of reference 30.

Note 20) p. 386 of reference 31 states that from the 13th century books became things to be worshiped and not read, and practical Tantrism was in the mainstream of the study.

Note 21) See p. 22 of reference 30.

Note 22) Chudākarma, a ceremony of practicing rituals, was started in 1440AD (see reference 33), during which a 5-12 year old Shākya or Bajrāchārya boy lives a life of a monk for 4 days. By receiving this ceremony, each of them receives a membership in the Sangha organization and holds the right and duty to participate in the monastery's recurrent functions. He has to take his turn as guardian of the principal deity.

Note 23) As described in p. 139 of reference 33, after the death of the last celibate monk in 1448, Newār Buddhism was established at the end of the 15th century.

Note 24) It is said that the systemization was performed by King Siddhi Narshinga Malla in the 17th century (see references 30, 31, 33).

Note 25) See p. 142-147 of reference 33.

Note 26) Currently, many Buddhist monasteries are used as Buddhist schools and general elementary schools and also partially being used as residences. The monks in Bahī were economically weak compared with those monks in Bahā. In addition, a difficulty existed in transferring from the life of a celibate monk to that of a non-celibate monk (refer to pp. 185-188 of reference 18).

Note 27) See p. 24 of reference 30. Incidentally, the new jobs were Buddha statue casting, astrology, and so on; the majority of people involved in this occupation, even in the present day are Shākya and Bajrāchārya.

Note 28) pp. 135-178 of reference 22 states that Kachā Bahā is a type of Bahā/Bahī that came into existence because of the changes in time, and it is a part of the residence of ordinary citizens.

Note 29) From the medieval period, Tibetan Buddhist monks started visiting the Bahā/Bahī of the Kathmandu Valley and maintained relationships with the monks of Bahā/Bahī. During that time, for the first time, Newār people became Tibetan Buddhist monks (see p. 33 of reference 30). In the Himalayan region of Nepal, the Tibetan Buddhist monastery "Gumbā" flourished and spread in Kathmandu via Tibetan refugees. Currently, 130 Gumbās exist in Kathmandu Valley (see reference 34). In addition, a room in the Bahā/Bahī was called "Gumbā" and used as a study room or library after collecting books and other materials related to Bajrayāna Buddhism (from field survey).

Note 30) See p. 316 of reference 31.

Note 31) Because Mū Bahī was originally the place of residence for a celibate monk, compared with the Bahā, it is rarely converted into private residence. Instead many of them have been used as the Vihār of Theravāda Buddhism consisting celibate monks (from field survey).

Note 32) See p. 145 of reference 33.

Note 33) As of 2010, there are 41 Theravāda Vihars within Kathmandu Valley (see reference 35).

Note 34) The project related to the ownership of the Bahā/Bahī played a major role in preserving the Bahā/Bahī in Patan. The details of this project were described based on interviews with the person who served as the mayor of Patan for 10 years and as president of the Society of Buddhist Monasteries for more than 20 years since its establishment.

Note 35) The method for constructing Bahā/Bahī was already developed as "Kriyasangraha-panjika" around the 12th century (see reference 36 for details). The existing Bahā/Bahī of Nepal were built via "Sutrapatana Bidhi" (reference 23, pp. 55-74). The architectural style that distinguishes the Bahā style from the Bahī style was most likely proceeded by the systematization of the Bahā/Bahī in the latter half of the medieval period (see p. 159 of reference 22). However, the basic method of constructing buildings around a rectangular courtyard, setting up a "Gundakuti" (a space with Buddha statue), at the central location from the front entrance of courtyard and setting up other monks' rooms facing toward Gundakuti was common in both Bahā and Bahī (See reference 23, pp. 70-74).

Note 36) The typical Bahā/Bahī is introduced on pp. 28-33 of reference 7.

Note 37) Reference 18 describes all forms of the Bahā/Bahī in Kathmandu Valley, but 3 types are shown in the main text.

Note 38) See reference 20 for 16 Mū Bahā and 21 Mū Bahī in the old city area of Patan.

Note 39) The guardian is a man who was trained in this Mū Bahā and a member of Sangha. The manager conducts his work by living in Mū Bahā and the guardian changes every month (see reference 14).

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