



ANALYSIS OF THE DIAGNOSTIC FEATURES OF BRICK ARCHITECTURE OF BRAHMAPUTRA VALLEY

Dr. Nilkamal Singha

Assistant Professor, Department of History , Bodoland University.

ABSTRACT :

Study of architecture reveal that underlining meaning of architecture and its relation to human experiences which have been expressed in number of ways in the past. Each style of structural construction reflects a distinctive pattern and principle of construction of the particular culture and era. As such they can be perceived as cultural symbols of the past and surviving historical civilizations and their achievements in the field of art and technological knowhow. Universally architecture means the style of design and the method of construction of structures whose aesthetic and functional dimension can stimulate and influence social life without presuming that, in and of itself, it will promote social development.



KEYWORDS : field of art and cultural symbols, social development .

INTRODUCTION:

Out of the thirteen sites and twenty five structures analyzed in the present study it is found that four temples are west-east oriented, sixteen east-west, one each north-south and south-north and for three of them orientation cannot be traced. In eight structures brick was exclusively used for structural construction and in the rest both brick and stone was used and almost all the temples are dedicated to Shiva.

Table 3. Architectural Arrangement of Brick Structure of Brahmaputra Valley

Temple/Site	Building Material	Orientation	Presiding Deity	Form (garbha)	Garbha Side	Approach direction
Baitbari I	brick	east-west		pancharatha		
Baitbari II	brick		shiva	octagonal	centre	8 sides
Madan Kamdev	brick and stone	various		rectangular	varied	varied
Paglatek	brick and stone	unknown	shiva		unknown	unknown
Kakoijana	brick	east-west		offset top		
Ganesh Temple	brick and stone	east-west	shiva	rectangular	west	east
Surya Pahar I	brick	east-west		triratha/ rectangular	west	east
Surya Pahar II	brick and stone	east-west		square	east	west and east
Dah Parbatiya	brick and stone	east-west	shiva	square	west	east
Garh Doul I	brick	east-west	shiva	offset top	west	east

Garh Doul II	brick	east-west		offset top	west	east
Bamgaon	brick	north-south	unknown	unknown	north	south
Rajbari I	brick and stone	east-west	shiva	square	east	west
Rajbari II	brick and stone	east-west	shiva	square	east	west
Rajbari III	brick and stone	east-west	unknown	square	east	west
Na Nath I	brick and stone	east-west	shiva	square	west	east
Na Nath II	brick and stone	east-west	shiva	square	west	east
Na Nath III	brick and stone	east-west	shiva	square	west	east
Na Nath IV	brick and stone	east-west	shiva	square	west	East
Na Nath V	brick and stone	east-west	shiva	square	west	east
Na Nath VI	brick and stone	west-east	shiva	square	east	west
Na Nath VII	brick and stone	west-east	shiva	square	east	west
Na Nath VIII	brick and stone	west-east	shiva	square	east	west
Na Nath IX	brick and stone	west-east	shiva	square	east	west
Mikirati I	brick	south-north	shiva	rectangular	north	South
Amtola	Brick and stone		shiva?			

Table 4. Broad features of early structures of Brahmaputra Valley.

Parameters		%	comment
Alignment	east-west	64	
	west-east	16	
	north-south	4	
	south-north	4	
	unknown	12	
Material of construction	Brick	32	
	Brick and stone	68	
Presiding diety	Shiva	72	
	others	28	
Garbha forms	Square	56	
	Rectangular	12	
	octagonal	4	
	unknown	28	

Table 5. Diagnostic features of brick structures of Brahmaputra valley, Assam (in metres)

Temple	Plan	Dimension LXB	Garbha Size (LXB)	Garbha wall Thickness	Mandapa	Mandapa wall (thickness)	Garbha entrance (width)	Mandapa entrance (width)	Outer wall (prakaar)&ll LXB
Baitbari I	Pancharatha	8.9X5.2			3X4		3.6	4X3	
Baitbari II	Octagonal	13X13	6.90X6.90	60 cm	2.7X2.7	20 CM			
Madan Kamdev									
Paglatek	wall								
Kakoijana	Rectangular	Broken ?X8.5	4.46X4.30			90 cm	2		10.9X8.5 unknown
Ganesh Temple	Rectangular / Triratha	32X19	7.6X6						

Surya Pahar I	Rectangular	37.85X19.50	6.9X6.9	1.5					2.5
Surya Pahar II	Rectangular	42.90X31.70	Stone						
Dah Parbatiya	Rectangular	24X11.5	2.4X2.5	1.3	8.4X7.8	1.8	1.0	1.1	1.8
Garh Dou I	Rectangular	21.6X14	8.20X8.20		7.2X10	2.0	4.2	4	2.0
Garh Dou II	Rectangular	21.76X13.6	9X9.5		8X10	2.0	3.95	3	2.0
Bamgaon	Rectangular	22?X18	NA	NA	7.5 approx. X6.1	1.3	3	3.1	
Rajbari I	Rectangular	11.4X6.7	2.2X2.3	2.1 sides 2.35 rear	4.5X4.0	1.26	1.1	1.1	
Rajbari II	Rectangular	18.2X8.0	4.6X4.3		5.15X5.5	1.26	1.3	1.5	
Rajbari III	Squarish	11.10X9.30	4.5X3.3		6.8X6.2	2.1 east side 1.3 sides		1.6	
Na Nath I	Rectangular	17X11	2.20X2.10			1.05			
Na Nath II	Rectangular	17X9.7	2.20X2.10		5.3X4.5	1.10	1.30		
Na Nath III	Rectangular	19.5X8.8	2.20X2.20		11X6.3	1.30	1.2		
Na Nath IV	Rectangular	15X11.5	2.18X2.28		5.5X4.5	1.10	1.0		
Na Nath V	Rectangular	20X11.40	2.0X2.0		5.4X4.8	1.10	1.2		
Na Nath VI	Rectangular		2.20X1.50						
Na Nath VII	Rectangular	19.4X10	2.35X2.33		12.2X7.2	90 cm	1.4		
Na Nath VIII	Rectangular	11X8.3	2.10X1.60		5.4X6.2	1.0	1.6		
Na Nath IX/ Kenduguri	Rectangular		2.20X2.20			1.30	1.2		
Mikirati	Rectangular	16X10	3X1.85		9.2X6.8				
Amtola	Square								

Table 6. Comparison of Northern Indian Nagara Temples and Assam Temples upto 1200AD.

Diagnostic element	Northern temple style/Nagara	Assam group- Phase III
Material of construction	Brick and stone, predominantly stone	Both but predominantly bricks
Shikhara	The superstructure above the cornice level	All are grounded
Roofs of axial addition to the shrine	Successive series of towers of the pitha	Superstructure not available for assessment
Elevation of the axial addition	Open mandapa type with	Open mandapa sometimes

	porched balconies or entrances.	with mukhamandapa
Mandapa	Present	Present
Mahamandapa	Optional	Absent
Mukhamandapa	Optional seldom present	Optional
Pranala	Not very typical. May be open channel on floor level or underground.	Upper plinth level
Vertical plumb line of the cornice (<i>manasutra</i>)	Well outside	Not available for assessment
Ceiling	Wide range of ornamentations	Not available for assessment
Dhvaja	Optional. May be on top on the shrine.	Outside on the entrance/ top of the shrine.
Superstructure above ground floor	Single mass	Diminishing top
Broad plinth	Mostly present.	
Prakaras	Optional.	Mostly present
Toranas	Often as entrance features	Unknown
Door	Very elaborate and ornate	Some with stone sculptured jambs
Main deity made of	Mostly of stone	All of stone so far
Dvarapalas	Small sized	Only one found, its small at Da Parbatiya

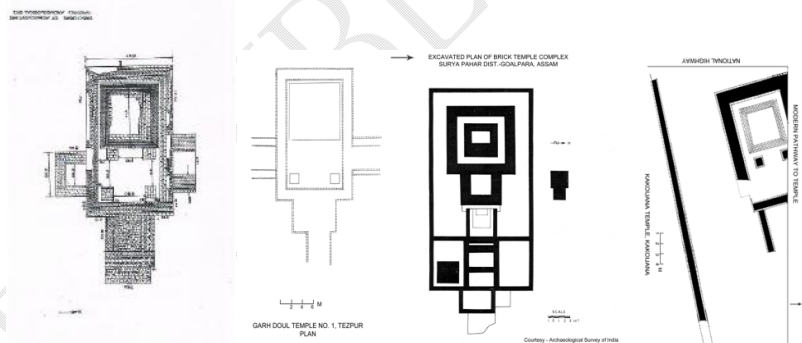


Fig. 16. Comparative plans of Garh Douli I & II, Surya Pahar and Kakoijana.

The size of brick from the sites of Jaljali and Garh Douli and Madan Kamdev are very similar, however, in Jaljali the stone sculptural art is very rich. On the other hand, Garh Douli has not shown any elaborate stone workmanship. Therefore stone sculptural art of Madan Kamdev and Jaljali are comparable. Structurally also the two sites are so similar that it can be termed as twin structures.

In the Hojai region, both stone and brick structures were raised but it seems stone structures were massive. At the site of Rajbari it is seen that equal number of stone and brick structures were raised but in Na Nath it seems that at least two stone temples were there as suggested by two grounded *amalaka* and large stone architectural debris, but rest of the temples are built with bricks in two rows; however, the temples are under the earth (in mound shape), one sanctum is slightly unearthed which yield the sanctum size similar to the Na Nath group.

The layout of the Ambari structure (early medieval, Ph-II) is very similar to the Mahadeosal. The orientation of both the structure cannot be ascertained due to the limited area excavation but their structural patterns are very similar, a cell of similar size was unearthed from both these sites and both the sites yielded pottery of the same variety and typology.

So far as the general layout is concerned, the brick structure of lower course of Brahmaputra have two ramparts (outer and inner) in case of Surya Pahar, Kakoijana, and Tamreshwar while the structure of Kopili Jamuna valley lack this feature whereas the structure of Garh Doul and Dubarani (Doiyang Dhansiri valley) has a single rampart. Another characteristic of all the structures is that the superstructure is absent. The layout and plan of Garbhagriha of Kakoijana (Bongaigaon) and Garhdoul bears a stern resemblance. However, in Garh Doul the enclosure wall (prakaar) is absent. It is also observed that the main plinth of the Garbhagriha of both Kakoijana and Garh Doul has several projections.

5.2. Moulded Bricks and Plaques

Moulded bricks are used alongside the plain ones. Moulded bricks are used in adorning the outer walls to beautify the structures and break the monotony of similar looking structures. Moulded bricks were made with hand moulds. Moulded bricks combined with plaques gave the structure different architectural perspective and dimension. Modern Bangladesh was a nerve centre of Buddhism under the aegis of Varmans and then Palas from 7th to 12th century and it is during this period that Buddhism was propagated to south-east Asia.

According to Rao between 8th-12th centuries, many heterodox creeds and sects emerged within both Buddhism and Hinduism existing alongside. Emergence of Mahayana school bestowed considerable freedom of expression to the artists as they were no longer bounded by socio-religious ridings to depict in their art; themes related to morality, restraint, simplicity, sacrifice (Rao, 2014) found expression. Rao also observe that the tradition of making plaques is essentially a Bengal phenomena that travelled to Pagan Temples in Myanmar and Pilak, Tripura via Comilla following Meghna. The plaques in Bengal connected with Buddhist monuments; the motifs and themes reflect greater closeness to secular depictions than Buddhist themes (Rao, 2014). Plaques are in use in the structure in Pandu Rajar Dhibi from earliest times. He is also of opinion that the making of plaques in Pagan and Bengal are similar and the arrangement of plaques is also in similar fashion. Plaques were also used in the temples of Brahmaputra valley however this use is limited to the outer face of the sanctum and *mandapa*. In the temples of Assam the themes depicted on the plaques are secular and tantric and limited from Hindu themes. In Paharpur plaques the depictions from Buddhism and Hinduism along with the themes from daily life, flora and fauna are popular.

Table 7. Comparative Sizes of Plaques from Assam, Bengal and Myanmar Sites (Rao, 2014).

Site ↓ Sizes→ (in cms)	Plaque size 1 (max)	Plaque size 2 (min)	remarks
Baitbari	48X26.5X5.5	39X23X3	varying size
East and W Petleik	40X38X13		
Ananda temple, Bagan	36X32X7		
Mangalazeidi	38X34x10		
Paharpur	40.6X30.5X6.35	35.5X20.3X21.6	varying size
Ananda Vihar, Comilla	101X53X15.2	38X30.5X12.7	varying size

The depiction recovered from Baitbari are of *Ganesh, Brahma, Vinadhara, Kali, Ugra tara, Vaisnavi, Manasa, Uma Maheswara Arjuna in penance* and other *tantric* figures (Sharma, 2003: 43-73). The plaques of Paharpur are thematically closer to Baitbari with predominantly Buddhist and Hindu icons.

The iconography in Baitbari seems to have been influenced by Buddhist plastic art initially which later on gradually Hindu sculptures dominated the representation. Plaques are also procured from Surya Pahar, Bargaon, Na Nath; the plaques of Na Nath are smaller in size than those found in Baitbari and

Bamgaon. The typical feature of Bamgaon plaques are that they are yellowish in colour, even bricks from this site are of yellowish colour.

Plates 56. Terracotta plaques from Brahmaputra Valley



a) Paglatek, Goalpara



b) Bamgaon, Bisnath



c) Na Nath, Hojai

Moulded bricks are important building material for ornate and elaborate brick edifices. Structurally they have the similar uses like general bricks as they are same building blocks with weight bearing properties. The use of these bricks is to beautify the outer walls of the structure. Elsewhere in Bihar, Bengal, Tripura, Bangladesh and Myanmar moulded bricks are profusely used in construction during 8th to 12th century. Moulded bricks are employed for two purposes, structural and decorative, sometimes serving both functions. Moulded bricks are mostly used on the outer face of the structure at its basal part. Due to the elaborate nature of their structures, brick was preferred in the Buddhist construction.

Bricks moulded in various designs have been yielded from various sites of Assam. Some of the designs are popular and common whereas some are rare. The designs of various bricks yielded from Brahmaputra valley are the following.

Plate 57 . Type of brick mouldings from Brahmaputra valley.



Table 8. Table Depicting Occurrence Type of Moulded Bricks.

Type→ Site↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Surya Pahar																				
Paglatek		Y		Y																
Kakoijana		Y	Y												Y					
Madan Kamdev																				
Garh DouI	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y
Da Parvatiya																				

Bamgaon	Y	Y	Y	Y					Y										
Mahadeosal		Y																	
Rajbari																			
Dek Dua	Y	Y	Y	Y					Y										
Mikirati																			
Amtola			Y					Y											
Ambari																			

Y= Yes

So far twenty different types of moulded bricks are yielded from excavations and surveys from the sites under the purview of this study. As far as the types of moulded bricks are concerned the site of Bamgaon has yielded more than 5 types of mouldings of different designs, whereas in Garh Doul 17 types of moulding are used and in Paglatek and Kakoijana 3 designs have been reported so far. About the designs Type 2 and Type 3 are most popular design appearing in the five sites. Type1, 4 and 9 appears in each of the three sites. Some of the mouldings have Buddhist connotation and that linkage can be established in more than one way. Firstly Assam (western) had always been under the Aryan zone of influence from its earliest period and politically it was ruled by kings based in Bengal or west Assam. Secondly the proselytizing and assimilating nature of Buddhism and Brahmanical Hinduism kept the region adventured throughout the past by missionaries, traders and adventurers alike.

In the Buddhist monasteries of Bangladesh and Bengal few similar mouldings can be seen, however in Assam these moulded bricks are yielded in debris and never in *in situ* where it was intended in the structure, recent excavation at Dek Dua in Goalpara however throw some light to where it was originally intended. The site of Dek Dua present the most elaborate terracotta work so far from the region however the excavation report is still to be published by the Directorate of Archaeology. The type 2 and Type 3 bricks were profusely used in the monasteries of Somapura in Paharpur, Naogaon Bangladesh.

Bonding and laying patterns

Strength of a brick structure depends on the bonding of the bricks and the binding material. The stretcher bond pattern was widely used in construction in Brahmaputra valley, sometimes with running stretcher bonds. The mortar used in the construction is mud mortar or red soil which has good binding properties. All the sites show certain preference for stretcher bond method.

Plates 59. Bonding and Laying Patterns in Brahmaputra Valley



a) Amtola



b) Paglatek



c) Ganeshguri



d) Mahadeosal



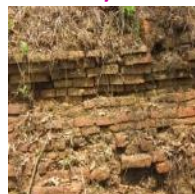
e) Madan Kamdev



f) Na Nath No.7



g) Surya Pahar



h) Na Nath No.5



i) Garh Doul



j) Na Nath



k) Amtola

Plate 60. Comparative Bonding and Moulding of Walls.



a) Garh Dou (Tezpur)



b) Moghalmari (WB)



c) Kakoijana (Bongaigaon)

5.3. Associated assemblages

Pottery consist mostly of the associated assemblages, along with the structure they form the chunk of materials to establish linkages among the various structures. Almost all the sites yielded coins of colonial period specially *annas*. These coins are yielded from Paglatek, Kakoijana, Surya Pahar, Ambari, Jaljali, Madan Kamdev, Mahadeosal, Garh Dou and the Hojai sites. It only shows that these sites were still revered till recent times and some to present in their debris form.

Pottery shapes from Pandi Rajar Dhipi are very akin to pottery yielded in the sites of Assam specially the bowl or handi shaped vessels. Pottery sequence of Brahmaputra valley starts from in case of Ambari from arretine and roulette wares, Kushana (typical Kushana inkpot), Ambari ware phase, with Mica washed wares, celadon ware, medieval glazed ware finally colonial (based on pottery, coins etc.). Due to haphazard construction and several seasons' excavation without proper excavation report the sequence of the site cannot be prepared reliably. In the present study it is tried to arrange on the cumulative basis.

Throughout red ware is the dominant pottery as most of the sites are religious in nature; the pottery generally are ritualistic and offering wares. Introduction of new pottery can be traced periodically which becomes signatures of the given period and the population. The Paglatek Phase I and Mahadeosal Phase I is similar to the Phase II of Ambari with similar pottery with appearance of mica washed pottery. This phase is marked by so called 'Ambari wares' from Mahadeosal and Ambari, both the site shows striking similarity of pottery. These two sites produced lot of other shapes which otherwise will not be considered as conventional usual shapes. Shapes yielded are all common shapes lota, pot, bowls etc.

Ambari ware pottery was followed by celadon and glazed wares. However occurrence of glazed wares is limited in fact it neither was nor recovered beyond Ambari (Guwahati).

Plate 61. Important pottery for indexing and comparative study



Table 9. Occurrence of Few Common types of Pottery in Assam Sites

Site↓ Type→	1	2	3	4	5
Surya Pahar	Y	Y	Y	Y(P)	
Paglatek	Y		Y	Y(P)	
Kakoijana					
Madan Kamdev					
Garh Doul					
Da Parvatiya					
Bamgaon					
Mahadeosal	Y	Y	Y	Y	Y
Rajbari					
Dek Dua	Y		Y		
Mikirati					
Amtola				Y	
Ambari	Y	Y	Y	Y	
Baitbari		Y		Y(P)	

CHRONOLOGY

Assessment of chronology was the most complicated part of the present study. This assessment is based on three parameters namely brick size and stratigraphy, sculptural art and associated assemblage predominantly pottery. The structures of Brahmaputra valley were constructed in three phases. The first phase was the earliest phase of which we have limited structural evidence and they represent the early historical period. The second phase is from 6th to 8th century and the third is from 9th to 12th century.

The first phase structure include the period-I structure of Ambari, as we can see that the period I structure of Ambari was an ablution tank with Sunga- Kushana character however we can assume that this structure went out of use due to the subsequent rise in water table and its steps got submerged. In later period this structure was filled with stone blocks and brick structure of following phase was constructed. So far the structure of this phase was only identified from Ambari. In Ambari excavations have not reached natural soil therefore leaving the scope for finding of pre Kushana assemblage. The finding of arretine and rouletted wares dating to 1st-2nd century, the Indian made variety establishes the area to be connected with East Indian littorals. Roulette wares appeared at terminal NBPW period (c. 250 BC) from Chandraketugarh (Gogte, 1997: 69-85.) Sisupalgarh (3-4th centuries) (Mohanty & Smith, 2009: 47-56) Alangankulam (Nagaswamy, 1991: 247-254.) and Arikamedu (Begley, 1988: 427-440) Amravati (Wheeler, 1946), Brahmagiri and Chandravalli (Wheeler, 1947: 181-310.), Tamluk (IAR, 1954-55: 19-20), Chandraketugarh (IAR, 1956-57: 29-30, 1957-58: 51-52, 1959-60: 50-52). Sisupalgarh (Lal, 1949: 62-105.), Rajghat (IAR, 1963-64: 59-60.). Gogtes XRD analysis of roulette wares from Sri Lanka and South East Asia resulted in the conclusion that Chandraketugarh- Tamluk region as place of origin of Rouletted wares found in South and South- East Asia (Gogte, 1997: 69-85). Gupta observes that "The Rouletted wares has been recorded all along the eastern seaboard of the sub continent, from lower Bengal to Sri Lanka in levels dated from 3rd century BC-3rd century

AD" (Gupta, 2005: 25). Finding of one sculpture with clear Sungan tradition consolidates the idea this area being an early historic site in Brahmaputra valley. This phase is all brick phase. Structure contemporary to Ambari Phase I is not identified so far in the valley. It is widely believed that Buddhists accompanied the traders and traders, being Jaina and Buddhist found it their moral duty to help them in their missionary zeal. Jainism was perhaps the first of heterodox sect penetrating Bengal and Pundravardhana, Kalpasutra speaks of different branches of Jainas in the area of Kotivarsa and Pundravardhana. Bangarh and Mahastangarh also evidenced considerable Jaina material from its early levels however, Asoka's inclination towards Buddhism put Jainism behind in popularity in Bengal and North Bengal in Particular (Gupta, 1993-94: 216-225). Divyadana even speaks of massacre of Jainas or Nirganthas at the deposition of Ashoka. Ashoka patronized Buddhism and in the following centuries it became the most popular heterodox sect. The region became so important in Buddhist itinerary that every visitor from Fahien, Huen Tsang, I-tsing, Atisa Dipankara all visited Pundravardhana and stayed for long time. For Brahmanism no specific period of their penetration to Pundravardhana can be traced however they became popular by the time of Guptas. Gupta revival of Hinduism resulted in large scale conversion of Jaina and Buddhist sites in to composite sites with Hindu elements and iconographic representations elsewhere earlier and Bengal and Assam later.

The second phase from 6th to 8th century show the twin tide of Brahmanical Hinduism and Buddhism and it was marked with still predominant use of brick and limited use of stone. Political situation in this period is stable Varmans ruled this period with firmness and during this period Kamarupa succeeded to come out from the stereotype of the place being inhabited by dangerous animals and cannibals and of prohibited land. Various Buddhist missionaries set foot here during this time. The marked feature of structures of this phase is Buddhist structures with Hindu influences and vice versa along with limited Jaina elements infused.

Table 10. Chronology of Brick Temples of Brahmaputra System.

Phase I	Phase II	Phase III
Ambari	Surya Pahar	Madan Kamdev
	Paglatek	Jaljali
	Baitbari I	Baitbari II
	Kamakhya I	Kamakhya II
	Kakoijana	
	Ganeshguri	
	Bamgaon	
	Dhek Dua	Hojai sites
	Mahadeosal-I	Mahadeosal II
	Garh Doul	

CONCLUSION

The preceding Gupta rule made a tremendous socio-cultural impact upon the valley and the Huna invasion during later Gupta period triggered migration of various people including artisans and sculptors to Bengal and to Assam afterwards the reason sculptural art of Bengal and Assam for certain period had classical bearing and within a generation or so these classical offshoot diffused into local art form. These two regions came under the political influence of Pala in Bengal and Malechchha in Kamarupa. However Palas patronized Buddhism and Shaivism also flourished in the kingdom and in Kamarupa polytheism with predominance of Shaivism flourished during the Malechchha period.

There are several sites with such characteristics of being composite in nature, these sites are Bhaitbari, Mahadeosal, Surya Pahar, Kakoijana, Dhek Dua, Kamakhya, Bamgaon etc. these sites bear structural and sculptural similarities with the structures of erstwhile Bengal.

The third phase is marked by stone built temples. There was a clear shift from brick to stone in this phase. This period also is marked by infusion of tantric elements in the sculptural art. The temples of this phase are influenced by the Orissan school. The third phase show the rise of Tantric features in the construction, not much new spots were identified for constructing structures. During this phase the fallen brick structures were renovated or rebuild with stone at the same spot. Almost all the stone temples of this phase show brick temple evidence in its basement.

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