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The Thirteenth Regular Report



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Cultural Heritage Protection Cooperation Office, Asia-Pacific Cultural Centre for UNESCO (ACCU)

ACCU Nara International Correspondent

The ACCU correspondents periodically send reports on cultural heritage protection activities in which they have been recently involved. This is a collection of sixteen reports submitted by international correspondents in the Asia-Pacific region.

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Hindu Deity Vishnu in Bangladesh

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From the very ancient times, the subcontinent of India is well known throughout the world for its economical resources and cultural heritage. In the different stages of history, many of big empires had come into existence here in this part of the world. Many glorious, historic, and commercial trade routes connected with this region of the world established wide commercial and cultural relation with many other civilizations of the world. Art and culture were widely spread along with the commercial development in this region. Consequently, from a very ancient time, different religions had widely expanded in this subcontinent in different times and different areas.

In the *Sanatany* (ancient) Hindu religion four gods who touched the heart of human being at the first time, God Vishnu was one of them. Although God Vishnu was not worshipped with pomp and grandeur in the ancient period yet, we find him to be regarded by the then Hindu community in the early medieval period. We get some information about God Vishnu in the treatise of '*Mababharata*' where in Vishnu is the superior god of the Hindu *Vaishnab* community.

"According to *Adi Shankar*, Vishnu is one of the five main figures of the lords of the universe."¹

According to '*Purana*', the colour of the body of Vishnu resembles the colour of a deep blue cloud. He is a quadrilateral figure and he holds *shankha* (conch shell), *chakra* (wheel), *gada* (mace) and *padma* (lotus). The figure of Vishnu has also been described as universal sovereignty in '*Vagabat Gita*.'

"Vishnu ordinarily has four hands in which he holds the conch-shell, a symbol of eternal time; the mace, a symbol of eternal law and the unfailling punishment, which is a consequent on its breach; the lotus, a symbol of the ever renewing creation and its beauty and freshness."²

The ten *avatars* (incarnations) of Vishnu have been narrated in '*Purana*'. Nine of them have been in the past and the tenth and the last is yet to come as the '*Purana*' says.

The total of the ten principal *avatara* (incarnations) is called '*Dashabatara*'. The account of this '*dashabatara*' (ten incarnations) is available in '*Garura Purana*' (1/86/10-11). These ten *avatara* would be held in highest esteem in the society for their power and influence. In the '*Vaishnab*' philosophy, any supreme power descended from heaven to earth for performing any particular noble work is called '*abatara*'. In Hindu religion, the word *avatara* is derived from '*Sanskrit*' *avatara* which means any super power voluntarily descended on earth for performing any particular noble work. Only such great souls are regarded as *avatara* for worship or adoration. These *avatars* are

respected by all and they possess super natural power.

"It is also true that in the *Mahavarata* and in some of the '*Purana*' a number of the *Avatara* is mentioned, but an attempt at systematization is first met within the '*Vagabata Purana*' where there are three lists of *avatara* of twenty two, twenty three and sixteen respectively..... But it is Jaydeva, of the court of Lakhsman sena (King of Bengal, in the 12th century A.D.), who gives a list of ten *avatara*.....This has since been the standard list of *avatara* and has been widely accepted."³

The ten *Avatara* are –

- (1) Matsya *avatara* (the fish incarnation)
- (2) Coorma *avatara* (the tortoise incarnation)
- (3) Varaha *avatara* (the boar incarnation)
- (4) Narasimha *avatara* (the human lion incarnation)
- (5) Vamana *avatara* (the dwarf incarnation)
- (6) Parasurama *avatara* (Rama with the battle-axe incarnation)
- (7) Lord Rama *avatara* (the perfect man incarnation)
- (8) Balarama *avatara* (Elder brother of Krishna incarnation)
- (9) Buddha *avatara* (Assimilation with Brahmanical incarnations)
- (10) Kolki *avatara* (the mighty warrior incarnation)

The rulers had played an important and vital role in the expansion and development of religious culture as well as art and architecture in ancient Bengal. As an outcome of that tradition, the lands were used for the expansion and the development of religious culture in one hand and in the other enormous religious architectures grew up throughout the country in the different ages in Bengal.⁴ In the other provinces of the then India, religious influence is found to have been predominant the *Baishnab* religion in the Gupta age which was first evident from many copper inscriptions found so far.

In the 2nd century A.D., Vishnu image has been detected in Bengal for the first time. The *Shushunia* Mountain situated on the 12 mile north-west of Bankura city in west Bengal and in the cave of *Shushunia* mountain, the worship of Vishnu has been traced in an inscription of King Chandra Varman. A *chakra* (wheel) was inscribed on this cave, and it seems to be a Vishnu temple. King Chandra Varman ruled over 4th Century A.D. in Bengal and he was devoted to God Vishnu. At the same time, some temples were built in the north Bengal and even on the top of the Mount Everest, and probably Vishnu image was established in those temples.⁵

In the *Vishnab* religion, Krishna (another incarnation of Vishnu) *lila* (love with female companions) became predominant all over in Bengal. Many stories were depicted of Krishna *lila* in the outer wall of Paharpur

Buddhist temple.⁵ Krishna lila was very popular in the 7th- Century in Bengal and the Vaishnav religion was prevailing up to the 12th Century A.D. which is evident from many Vishnu image found so far. It can be easily estimated that *Vaishnav* religion had expanded in Bengal from very ancient time.

Some features of Vishnu image:

Vishnu image No. 1: The most ancient Vishnu image has been found at Narahatta, Bogra district in Bangladesh which had probably been depicted in the 2nd Century A.D. This image is preserved at Varandra Research Museum in Rajshahi Division.⁶ The image is inscribed on the hard granite sand stone and standing on a plain pedestal, whose height is 65cm x32cm. His body and shoulder are very strong. He has a big size of Karanda *mukuta* (crown) in his head and a pair of ear ring in his ears. He holds a big size *gada* (mace) and *chakra* (wheel) in his lower right and lower left hand, *padma* (lotus) and *shankha* (conch-shell) in his lower right and upper left hands. There is a belt in his waist, and he wears a *Dhuti* (lion cloth) at its lower part like a rope hanging between two legs. A few ornaments, plain halo and the absence of two female companions indicates that the image was depicted in Kushana period and hence to the 2nd Century A.D.⁷

Vishnu image No. 2: The four handed Vishnu inscribed on buff colour sand stone. However, the right upper hand and lower left hand are missing. He holds a conch in his left hand and right lower hand holds a round object. Akirita *Mukuta* (crown) on his head and it is surrounded by a circular halo. He is ornamented by a necklace, earrings and a waist belt. His *Dhuti* (loin cloth) clings to his upper part and its lower part like a rope hanging between his legs. His two female incarnations Lakshmi and Sharasvati also absent in this image. "From an iconographic point of view the image roughly corresponds to an early Vishnu image from Taxila, which is usually assigned to the fourth century A.D. and late Kushana period."⁸

Vishnu image No. 3: All common features of Vishnu are

depicted in this image. Only Gada Devi and Chakra Purush depicted instead of two female companions Lakshmi and Sharasvati and this image is made by bronze frame. They are comparatively more decorated from earlier two, and dotted ornamentation is included in this image. These images are dated in early 8th century A.D.

Vishnu image No. 4: The Vishnu image has nicely been depicted on bronze frame. In this frame, Vishnu stands on a high lotus and his two female companions Lakshmi and Sharasvati with flexibly stands in his both sides. It is noted that Lakshmi and Sharasvati are daughter of another powerful Hindu deity Durga and Shiva. His *babana* (vehicle) Garuda is depicted under the lotus seat and the other common features are described as before. It is 25.5cm high. This image is comparatively more ornamented, and its skilled craftsmanship prove that the cultural practice was developed in Bengal from very ancient time and it seems this Vishnu image depicted in the early Pala period (8th Century). This image has been found at Mahasthangarh in Bogra district, and now it is in the Victoria and Albert Museum, London.⁹

Vishnu image No. 5 Balarama: The Balarama incarnation of God Vishnu is inscribed in a fine sand stone, and it belongs to late Gupta style. Seven hooded snake canopy is surrounded in his head. He bears a pestle and ploughshare in his upper right and left hands and with lower right hand he holds a cup and the lower left hand is shown on the waist. *Kundala* (earring), an armlet, a chain and a nice crown are shown on the entire body of the god. He wears a rope like cloth and is tied with a beautiful girdle. Two female attendants are shown lower part of the image. Now it is displayed in the Paharpur World Heritage Site Museum, Naogaon district. Height of this image is 81cm and width is 43cm.

Vishnu image No.6 Parshurama avatara: God Vishnu was born as Parshurama *avatara* (incarnation). The god is inscribed on the black stone with very simple decoration.



Image No. 1



Image No. 2



Image No. 3

The god stands on a double petaled lotus with trivanga pose. He holds shankha, chakra, padma and parasu (axe) instead of gada in his four hands. The Garuda (vehicle) in anjali pose is depicted at the bottom of the lotus seat. There is no other ornamentation remaining on the part of the black stone slab. Only the border of the stela is decorated. This image is 83cm high and made in 9th Century A.D.

Vishnu image No.7: This Vishnu image is very simply fabricated. This image is slightly broken and made with sand stone. He stands in *Divanga* pose but is a very strong and attractive figure. The god stands on a simple pedestal. He holds *shankha* and *padma* in his upper right and left hand and *Gada Devi* and *Chakra Purush* in his lower right and left hand. There is only an ornamented crown in his head and a simple halo on the back side. He wares a very fine and perfectly plain short *Dhuti* with

a beautiful belt. Now this image is preserved at Vangura Thana in the district of Pabna.

Vishnu image No.8 Baraha avatara: (The boar incarnation): This is one of the best specimens of the 10th century A.D. The boar faced God Vishnu took the form of a boar to save the Earth Goddess '*Prithivi*' from the clutches of demon '*Hirantaaksha*'. During the great flood, the earth was submersed under the water. After a long struggle with the demon, at last of all, *Baraha* Vishnu rescued the earth.¹⁰ His right foot is firmly placed on the lotus seat, and his raised left foot is placed on a double petaled lotus held by *Nagini* (serpent-virgin). The human headed *Naga* (serpent) and *Nagini* are beautifully inscribed very close to both legs of the deity. Except for his face, the deity has a very strong body and he holds gada, shankha, chakra and padma in his four hands. There is a beautiful upturned lotus over the head of the god. Entire black



Image No. 3A



Image No. 4



Image No. 5



Image No. 6



Image No. 7



Image No. 8

stone slab is free from other decoration.¹¹

Vishnu image No. 9: This is the best example of metal caster's art, which is the famous silver image of Vishnu. It is highly decorated. In the 10th-12th century, it was the crucial period of evolution of art and culture in Bengal.

Vishnu image No.10: Garuraha Vishnu: here Vishnu God seated on his *babana Garura* (vehicle). Vishnu's two foot keeps on the Garuda's palm. The black stone slab is beautifully ornamented with various kinds of animals, flower, leaf and floral design. Moreover, inscribed another two flying Gandharvas are coming with chain or necklace for the god as gift.

Conclusion: A number of images of Vishnu are found in Bangladesh. Vishnu is the strongest god of Hindu religion. From very ancient time, he came in different

forms and figures in different ages. In the basic trinity of Brahma, Vishnu and Shiva, the Hindu God Vishnu is the preserver and protector of creation. Vishnu is the embodiment of mercy, goodness, and the self-existence, and all-pervading power that preserves the universe and the cosmic world.

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Image No. 9



Image No. 10



Image No. 10A



Vishnu image (10th-11th C.)



Vishnu image (10th-11th C.)



Chubjakha Dzong Ruin Archaeology Project

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Division for Conservation of Heritage Sites under Department of Culture, Ministry of Home and Cultural Affairs

Introduction

The “Inventory and Documentation of *Chubjakha Dzong* ruin” project was carried out as an educational training program by the Division for Conservation of Heritage Sites (DCHS) under the Department of Culture, Ministry of Home and Cultural Affairs, Royal Government of Bhutan in cooperation with HELVETAS Swiss-Intercooperation, Bhutan, Swiss Liechtenstein Foundation of Archaeological Research Abroad (SLSA), Switzerland, under the Phase II of Bhutan-Swiss Archaeology Project. The project was led by Mr. Christian Bader, Archaeologist, SLSA, and coordinated by Mr. Karma Tenzin, Architect, DCHS and Mr. Sangay Kinga, Asst. Architect, DCHS. Besides the aim to build human resource capacity through the training program, the main objective of the project was to document and map the entire fortress complex and to carry out research on the historical information of the site.

Chubjakha Dzong Ruin: Geographic location

The *Chubjakha Dzong* ruin under *Hungrel gewog, Paro Dzongkhag* is situated some 500 meters above *Paro Rinphung Dzong*. The *Chubjakha Dzong* ruin is located on a ridge overlooking Paro valley and the site approximately covers around 10 acres of land. According to its nature of the layout of the *dzong* (fig. 1, fig. 2, fig. 3), which was built on a strategic locations, it clearly explains that the *dzong* was built solely for the defense purpose to protect from the invasion from enemies. The site is connected by a feeder road and takes around 20 minutes’ drive above the Paro National Museum.

Exact Location (Site coordinates, Drukref 03)

E 194457.730

N 3034809.540

Altitude 2878 m a.s.l

Historical Background/ Oral History

According to the different accounts, both written and oral, the *Chubjakha* was earlier known as *Chewekha*, which means ‘the area with a vast open sky’, the name given after the natural landscape of the area and was originally the religious seat of Kunkhyen Longchen Rabjam (1308-1364), one of the well-known Buddhist Masters in 14th Century. Later in the 15th century, Drung-Drung Rinpoche Gyalchok took over this seat. It is said that the temple was destroyed by fire and later was expanded and converted to *dzong* by the descendents of Drung drung Rinpoche as the country was going under several wars. In Bhutan, the existing *Dzongs* (fortress) were mostly built by *Zhabdrung* during his era (17th Century) or were built later. The pre-*Zhabdrung Dzongs* are mostly in ruins and *Chubjakha Dzong* ruin is one of the pre-*Zhabdrung Dzong*.

The overall fortress complex is surrounded by two

defense ditches, outer and inner ditches (fig. 4). The fortress complex consists of five storied main central tower structure (*Utse*) (fig. 5), surrounded by structures attached around the central tower in the north, east and south direction, and had served mainly as defense room since outer walls of this structure has several small triangular opening slits (arrow slits) (fig. 6) for shooting as well as for ventilation. The western façade (front, entrance side) of the *Utse* are collapsed, probably due to the earthquake in 2011, whereas the eastern, northern and southern walls are still standing till the roof level.

There are six watch towers surrounding the *Utse* (fig. 7), the northeast and the southeast watch towers are later expanded by adding towers each thus making it six. The watch towers probably must have served the purpose to keep an eye on the enemies and attacks in all four directions. Currently huge trees and vegetation has grown on top of the watch towers and are all covered with debris from the collapsed wall and vegetation.

The fortress complex is connected by a well-protected, gently sloping downwards passage in westerly direction (Fig. 8) to a sequence of four structures. The passage has defense stone walls on either side with arrow slits. The three structures in between the fortress complex and the lower most towers, *Chu-dzong* (Cistern tower, fig. 9), are also watch towers overlooking the *Paro* valley.

There are several open area/terraces (baileys) around the fortress complex probably used as agricultural field or as an open space for the activities held.

The main entrance to the fortress complex is from the south west corner near the watch tower, a small excavation (fig. 11) was carried out in order to confirm the entrance as it was quite unclear in the beginning with fallen debris and vegetation grown over it.

The whole fortress complex is mostly a stone masonry construction, with some inner parts built of rammed earth. The quality of both the stone masonry and rammed earth construction (fig. 10) are exceptionally excellent. Many large wooden lintels of doors and windows are still intact, which can be used for scientific research for dating. The overall state of the ruin is in good condition.



Conclusion

The Chubjakha dzong ruin which dates back to 14th century, one of the few fortress ruin remains of a pre-Zhabdrung dzong, located on a ridge overlooking the Paro valley, is not just historically important site but also a very potential archaeological site for historical research and study on pre-Zhabdrung dzong architecture. The study of the ruin shows that the layout of the fortress complex is more or less similar to the dzongs built during Zhabdrung's time.

The overall state of the ruin is fairly in a good condition, however, some parts of the outer walls has collapsed, probably due to earthquake of 2011 and some part of the walls of the structure are on the verge of collapsing. The vegetations have grown dense and are affecting the masonry walls, thus there is urgent need protection and conservation of the site. Realizing the need and its urgency the plan of the Ministry of Home and Cultural Affairs is to protect from further damage, consolidate the structure and carry out scientific research of the site.

Glossary

- Chubjakha* = Name of the present site
- Dzong* = Fortress
- Hungrel* =Name of a block
- Gewog*= block
- Paro*= Name of place
- Dzongkbag* = Districts
- Zhabdrung Ngawang Namgyel*= Buddhist saint and historical figure who unified Bhutan in 17th Century.
- Utse*= main central tower

Bibliography

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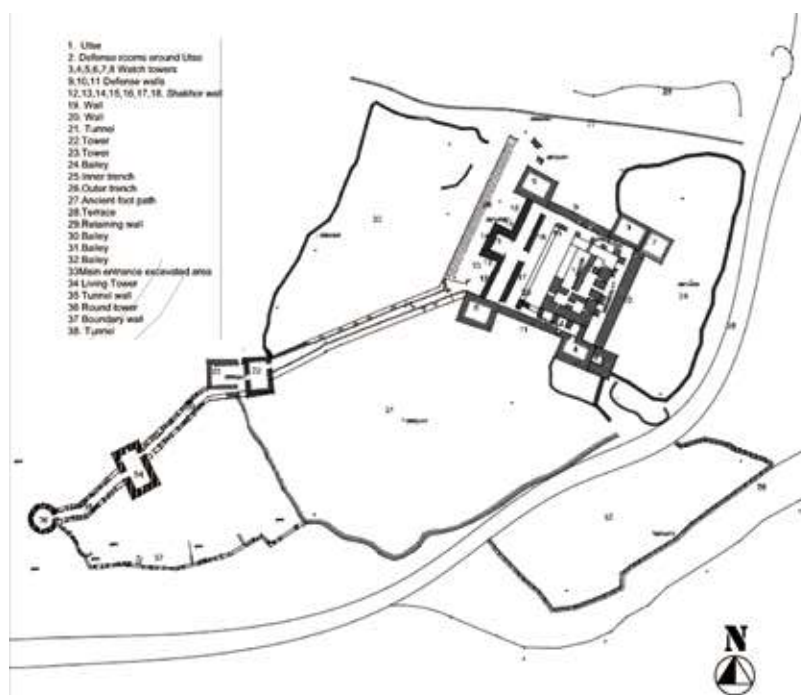


Fig. 1 Layout plan of the Chubjakha Dzong ruin

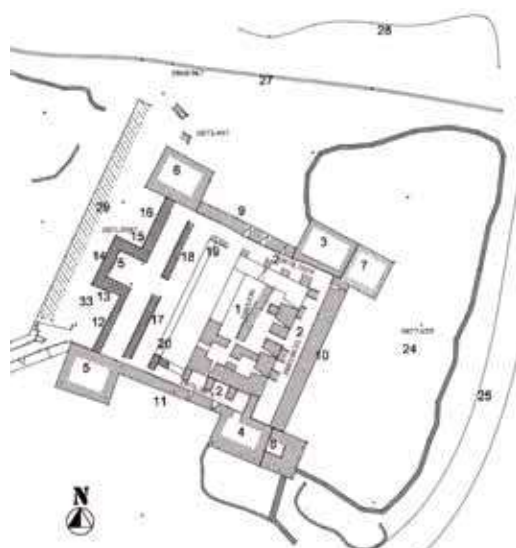


Fig. 2 Blown up Layout plan of the Chubjakha Dzong ruin

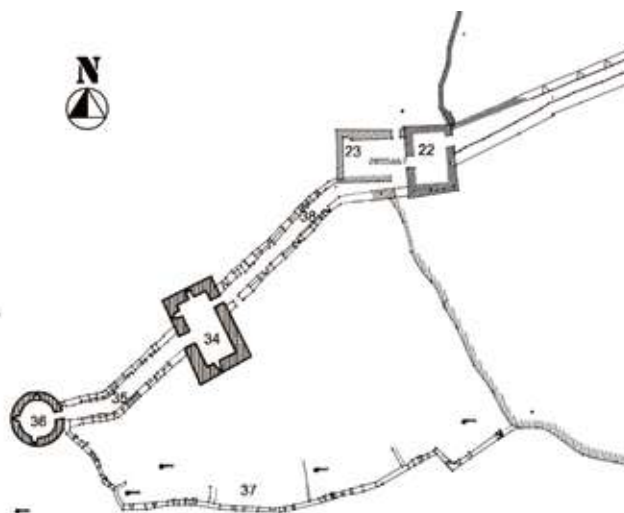


Fig. 3 Blown up Layout plan of the Chubjakha Dzong ruin



Fig. 4 Inner ditch



Fig. 5 View of Central tower (Utse)



Fig. 6 Arrow slits



Fig. 7 View of Northeast watch tower



Fig. 8 Tunnel passage



Fig. 9 Cistern tower



Fig. 10 Inner rammed earth walls



Fig. 11 Excavated area at main entrance



Fig. 12 Eastern Façade of the dzong



Recent Restoration Work: Sacred Bull Tower in Sambor Prei Kuk

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1. Introduction

My last report mentioned about the Inscription Documentation of Sambor Prei Kuk. This report I would like to describe a recent Sacred Bull *Mandapa* restoration work. The Sacred Bull *Mandapa* known as 'S2' in inventory list (from here I will be referring to the Sacred Bull *Mandapa*). This S2 is composed of a brick tower structure called prasat, where a sandstone *Mandapa* was placed inside. This tower located and aligned with the median axis of the central tower of Prasat Yeai Poan, the Southern Group of Sambor Prei Kuk. Prasat Yeai Poan is a major Shivaite complex in the early of Chenla Dynasty (early 7th century). The inscription mentions about the 'Silver Sacred Bull Nadin' in reign of King Isanavarman I (613-635 CE), and it is also parallel to a type of layout plan of Shivaite temple that the Sacred Bull Nadin *Mandapa* was placed opposite with the central shrine that had the Shiva figure inside.

2. Previous Restoration Work

The cement mortar and concrete work remained on the structure of brick tower shows that there was a previous restoration work of the Angkor Conservation Office before 1970s. During the unrest period, S2 is one of structure interrupted by the looted activity.

In 1995, the Department of Cultural Heritage (Reformed to General Department of Cultural Heritage) of Ministry of Culture and Fine Arts (MCFA) had an emergency mission to fill its 2.4 metres depth of the looted pit. In 2004, the Sambor Prei Kuk Conservation Project (SCP) conducted an excavation survey and clearance work in the S2 chamber. In a rainy season of August 2006 (Fig 1 & 2), this S2 was collapsed by the rainstorm, half of brick tower was collapsed and the sandstone *Mandapa* was broken down. Immediate action was taken by the MCFA in setting up a restoration plan in 2007. They supported the remaining brick tower and restored the sandstone *Mandapa*.

3. Current Restoration Work

Recently a team, Department of Safeguarding and Restoration of Monuments, from the MCFA has conducted the conservation project for the S2 again. This mission is started from July to October 2013 in the aim: **1.** Clearance and excavation, **2.** Restoration of elements and **3.** Improving the supported materials.

3.1 Clearance and Excavation

Interior clearance: As already mention, the clearance work within the S2 chamber were implemented by SCP in 2004. The rainstorm in 2006 caused the building to collapse and the space of the interior partly covered by the collapsed brick fragments. Again the interior clearance is conducting this activity.

Excavation: It is a part of the study investigation with the excavation survey on the west door of the chamber in 0.7

metres depth (Fig 3). Students from the high school of the community also participated in this excavation (Fig 4). During this excavation found some artefacts related to the architectural elements and some ceramic fragments (Fig 5).

3.2 Restoration of Elements

Besides the ages of the building structure, the water leakage between the brick elements is another reason caused the collapse of the building last time. To avoid from the above reasons the project have decided, after the monitoring process (Fig 6), the steps below:

- Application of injection filling to delaminated surfaces and joints: the delaminated surfaces and joints of elements, brick and sandstone; they are probably best to re-fill areas with adhesive materials, as necessary (Fig 7 & 8). They will be applied with improved epoxy resin mortar which after the experiences from the SCP. The joints in bonded or cracked areas have been treated and consolidated with improved mortar. For the large broken elements, stainless-steel screw bolts are used to join them.
- Application of new materials: Even though trying to keep the authenticity of monument, the project also uses new bricks to apply on artificial brick materials. The new are supposedly the 'proper' material to protect the original surface from the rain water leakage (Fig 9 & 10).

3.3. Improving the Supported Materials

To improve the temporary steel supported and covered structure with the proper strong material, the project decides to make a new structure while waiting for the future of conservation (Fig 11 & 12).

Acknowledgements

This report and conservation project would not have been possible without the cooperation of Mr Hin Sophorn, Vice Chief of Department of Culture and Fine Arts in Kampong Thom.



Fig 1 & 2. S2 Tower before and after collapse on July and August 2006 (Photo: Chan Vitharong/SCP)



Fig 3. Excavation trench, west entrance of the tower (Photo: Chan Vitharong)



Fig 4. During excavation survey, with the participation of the students (Photo: Hin Sophorn)



Fig 5. Ceramic artefacts found from the excavation (Photo: Hin Sophorn)



Fig 6. Structure survey (Photo: Hin Sophorn)



Fig 7 & 8. Western door sill, found from the excavation and after consolidation (Photo: Hin Sophorn & Chan Vitharong)



Fig 9. New brick materials have replaced to support the structure (Photo: Hin Sophorn)



Fig 10. Consolidated bricks and new brick materials (Photo: Chan Vitharong)



Fig 11 & 12. Before (in 2008) and after improve the temporary covered roof structure (Photo: Chan Vitharong)





Role of Festivals in Shaping the Urban Spaces of the Temple Towns of Tamilnadu

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Introduction

The article presented here is largely based on an extensive research carried out by the author in the temple town of Srirangam in Tamilnadu and referencing several scholarly articles on the subject. The rituals and festivals have played an important role in shaping the social and spatial disposition of a growing temple centric urban centre in India. The spaces generated by them are an important constituent of the cultural heritage components of a temple town and their conservation is essential to preserve the identity of these towns. A systematic listing of them, analyzing the reasons behind their evolution and a study of their past and present usages contributes largely in characterising the cultural significances of such religious centres through a better understanding of its urban morphology. The process of urbanisation prevalent between the 10th and the 18th centuries AD in Tamilnadu may have played a key role in the origin of some of the most important festivals and the inception of a panorama of ritual spaces, which got incorporated into the final scheme of the shaping of a religious urban centre.

Types of Festivals

The festivals of the temples are conducted throughout a deeply symbolic year that follows the Tamil calendar, the year being divided according to the Solstices and Equinoxes.

The festivals are classified into:

- 1) Parvotsavas –Festivals that last for short duration and are celebrated within the temple complex.
- 2) Ekadinotsavas –Single day festivals when the utsava murti(s) (an idol of the presiding/sub shrine deity taken out in procession and worshipped during festivals) that may or may not leave the temple complex.
- 3) Masotsavas –Monthly festivals that are celebrated for more than a day and it is a practice that all functions and processions of the masotsavas happen in the evenings. The utsava murti (s) may or may not leave the temple complex.
- 4) Brahmotsavas –Annual festivals varying in number from one (or more) to more than five or six, in temple towns like Kanchipuram and Kumbakonam, where more than two or three presiding deities were established by rulers during various period. They last for ten to eleven days. They are characterized by the famous chariot processions around a pradakshina patha (circumambulatory path) towards the end of all celebrations.

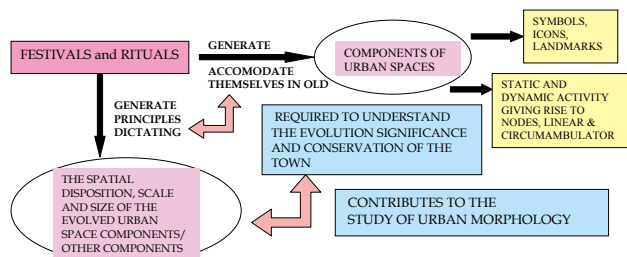
Most of the structures were conceived and evolved for their usage during festivals, or roped into being essential part of one or the other festival, in addition to the original purposes they served, thus sanctifying them and ensuring that they enmesh themselves into the urban morphology.

Manifestation of Festivals on the Urban Spaces

The study of urban spaces under the context of discussion can be classified under two headings, within the purview of the temple town and its hinterlands in the historic context (rural setting) which have transformed into developed zones (urban setting) in today's context. These spaces have been woven together by certain principles to form a holistic urban mesh, which contribute to the form of a historic 'Temple Town' today.

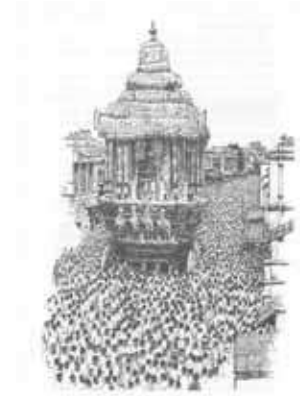
- 1) Macro level (the core town and its setting)
- 2) Micro level (the core town)

The ritual spaces generated by the festivals can be broadly studied under the following categories:



Circumambulatory pathways

- Within the temple complex
 - Within the temple complex, the clockwise circumambulation of the *pradakshina-patha* (circumambulatory pathway) by the worshippers is an important ritual. During festivals, the *utsava murti* and the common mass circumambulate the main shrine.
- Outside the walls of the temple complex
 - In many cases, the circumambulatory path defined the extents of the city. The chariot procession would take place at the outermost enclosure that surrounded the city to facilitate all the inhabitants (including the lower castes) in the precincts of the town and sometimes, even the hinterland to get a glimpse of the supreme presiding deity.
 - The presiding/subsidiary deity is taken out in procession either on a platform or in a *vahana* (the vehicle carrier that differs from one God to another as per the Hindu mythology) on all the ceremonial occasions. The deity is received at the doorsteps by the people who offer their prayers; an act that brings the spiritual master closest to the people.
 - In order to accommodate the large ceremonial chariot and the hundreds of people accompanying it, the processional route is made as wide as 15–20 metres (the dimensions varied as per the size of the town). It continued to act as the most important and the only concentric pathway for the domestic circulation in the planned temple towns.



Chariot moving around the circumambulatory pathway with devotees thronging around during the temple festivals



The axial streets and ceremonial axes leading to the temple gateways thronged by commercial developments on either side catering to the native inhabitants as well as the pilgrims



The chariot stand housed along the concentric streets, with the adjoining pillared pavilion used to mount and dismount the deity during processions as well as store all the relevant accessories

Pillared pavilions are a common feature amidst orchards either granted by the temple as an endowment or belonging to the temple itself



The River Ghats have pillared pavilions constructed along their Ghats to support traditional rituals like offering prayers to ancestors and tonsure etc which require a holy dip after the performance of rituals. These are also used during festivals hosted on dry river beds

- The turning radius at the corners of the circulation path also drew special attention in the traditional town planning principles, generated by the festivals.
- According to the Agamic (texts, the domestic structures around the processional pathway should not be higher in scale than the ceremonial chariot itself –the concept of the humble human in the resort of the infinite Lord is stressed here.
- All the houses built around the circumambulatory path in most of the temple towns were historically never more than two floors.
- All the houses had a transition space called the *tinnai*, a semi open veranda space which is a common feature in all the traditional houses that facilitates view of the rituals/festivals on the street and accept the honours of the deities in return to the services done. These spaces also house the pilgrims who required a space to sleep over the night when they came from distant villages to attend the festivals.
- Various sacred sites throughout the landscape in the surrounding countryside.
- The sacred sites throughout the landscape vary from small structures enshrining the local deities to bathing spots at nearby rivers & ponds.

Axial streets as ceremonial axes

The East–West ceremonial axis acts as an important ceremonial path in most of the temple towns, where traditionally the main deity faces the East or West and is accessed from the river or tank. The sacred feelings of a pilgrim who moves along the primary axes towards the main shrine is especially enriched during festivals, by the setting around, in processions that mark the end of almost all festive days, twice a day during the festivals, one in the morning and the other in the evening

Pillared pavilions

The pillared pavilions are the products of a wide variety of festivals celebrated traditionally. They serve various purposes during festivals. Festivals meant congregation & congregation required large, airy and covered spaces. Columns spanned large spaces and soon these became an essential component of every temple town. They varied in sizes and are dispersed within the town, hinterland and distributed orderly within the temple complex. They contributed largely to the expanding size of the temple. These can be broadly classified according to their function as:

- Large pavilions used as congregation and performance spaces during festivals.
- Small pillared pavilions used by the utsava murti as a resting space during processions.
- As a space where the utsava murti honours the endowment donators and landowners, symbolically inspecting His lands. The pilgrims accessing the shrine from the ceremonial axis use the same pavilions as a resting space at regular intervals.

Storage spaces for ceremonial chariots and vahanas

The ceremonial chariots are stored right in front of the pillared pavilion used for alighting the utsava murti. It is usually at the intersection of the axial street and the concentric street. In some cases where the

circumambulatory path is wide enough, they are stored along the outer enclosure wall of the temple complex. The *vahanas* are always stored either in the pillared pavilions within the temple complex or in the temple treasury closer to the inner sanctum for greater security

Sub shrines

The tutelary shrines or the village Gods lost their prominence when the *bhakti* movement (Hindu religious movement in which the main spiritual practice was loving devotion among the Shaivite and Vaishnava saints) initiated the construction of Vishnu and Shiva temples of monumental scale, undertaken by the kings and the nobles. However, in order to legitimize his rule among the lower class village subjects, myths were promoted linking these Gods to the Kali and Mariamman cult. This God is often vaguely identified with Durga. These shrines were linked to the processional festivals of the temple, so as not make the lesser subjects of the land feel neglected by the king (symbolically through the divine Lord of the land). When the towns began to assume an ordered urban form, the tutelary shrines were roped in, and mostly fell in the line of a ceremonial axis or circumambulatory path.

River Ghats

Most of the temple towns have come up along the important rivers of Tamilnadu, where the three kingdoms of Cholas, Pandyas & Pallavas ruled for centuries together. Festivals are celebrated along the river ghats either thanking her for good irrigation facilities over the year or pacifying her in times of flood. Separate pillared pavilions, along with bathing ghats were provided along these banks, sometimes to perform death rituals on the banks of these rivers. These pavilions are mostly along the ceremonial axis and link the temple with the river during festivals.

Dry river beds

During summers, the riverbeds are dry and can be easily crossed over. They are either used as a cross over medium for the utsava murti visiting many sub-shrines in the hinterland or used as an important interactive space for the presiding deities of different temples in the area on various occasions. The Riverbed becomes an important element of the urban morphology, and it is usually linked to the main temple through the ceremonial axis in many cases. Many pavilions have been erected along the river



The dry river bed where temporary stages are constructed to celebrate festivals, flanked by pillared pavilions and Ghats on its embankments as ritual spaces

ghats to accommodate the rituals accompanied during such festivals. Fairs are a common feature on the river beds where vendors from neighbouring areas try to sell their goods, just as they would do on the concentric and axial streets of the temple town on any other day. The already existing river is charged with a sacred meaning and new urban spaces had evolved due to the introduction of new festivals.

Tanks and channels

The sacred tanks are primarily located within the temple complex. They are also located at some distance from the core temple, usually linked geographically by a strong axis, and integrated ritually into the urban configuration by the 'Float Festivals'. These tanks were dug as community tanks and the responsibility of their protection and cleanliness lay with the community and the temple. The Kings used the central pillared pavilions in summer as pleasure pavilions for cool breeze. By charging these spaces with a sacred meaning through introduction of festivals, the community is held responsible for maintaining the tank and its surroundings clean.

Open spaces

Apart from the water bodies, streets, orchards & coconut groves also serve as platforms for celebration of festivals. In most of the important temple towns, within the historic core, large open spaces exclusively used for recreation purposes were a very rare phenomenon. The ancillary spaces were used for such purposes. This was another factor that led to the evolution of the tinnai space in front of every household –a perfect interface between the street activities & the private core. Many of these festivals gave rise to the concept of fairs, where people from the nearby hinterland would sell their merchandise and interact with traders to get their annual contracts for various commodities. The shops of the fairs occupied the broad concentric processional pathways or the axial streets immediately in the vicinity of the main entrance to the shrine that would attract the maximum crowd. Villages offered greater open spaces to host huge annual fairs. The open spaces are used for musical concerts and folk performances during festivals. Temporary structures

using wooden poles and thatches were used to make stages where dramas were performed that would attract huge crowds from the hinterlands. It was an occasion for the people to know more about the mythologies that would related them to their temple in a haptic sense. The coconut groves and orchards are inspected by the Lord annually and the utsava murti visits them in his vahana, honours them for their service and accepts their fresh endowments if any. These groves were not physically roped into the urban realm but were linked in a more symbolic sense indicating that every space had significance in the land of the Lord. However they act as a perfect setting to such centres, a backdrop against which the town would thrive.

Conclusion

Festivals and rituals are one of the most significant factors that have played a very important role in influencing the urban morphology of historic temple towns. The nature of influence starts from the design of an individual space (closed or open), and spreads in a very systematic manner to the overall structure of the city. These ritual spaces and their integration into an urban form following a basic order, and rhythm, are the invaluable products of time, which have sustained themselves for centuries and acted as tools for controlling the building process. Though they were introduced by the kings for the legitimization of their rule as a primary intention, they were woven beautifully into the cultural milieu of the people –a factor that has led to their sustenance till today albeit with variations. In order to understand the underlying principles of traditional town planning, it is essential to comprehend the role of festivals as an important determinant of the temple centred settlements. The variations in the practice of these festivals may be very little, however what has changed is the tangible expression of these –the urban forms and their linkages, which in turn have affected the spiritual experiences so essential for a sacred space, so as to render that divine contentment to a devotee who visits any temple precinct. The understanding of the whole phenomenon is essential to signify any temple town of heritage value so as to integrate them with all development processes.



One of the most sacred open spaces in a temple town is the temple tank that acts as an important community space both during the annual float festivals as well as others days in a year. When the tank gets dry its used by the community as congregational space similar to dry river beds.



Documenting Traditional House of Sundanese: Bumi Alit Kabuyutan

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One of the material cultures that are fairly and widely present in the society is the result of architectural creations. The title that has been given to this architecture is “typical architecture” of the region. Typical architecture of the region refers to specific characters of buildings located in a region. The character was embodied in the form of the building. Based on the shape, it embodies the specificity meaning on the region. Precisely because of its special characteristics it becomes a marker of regional architecture. In other words, just at a glance people will easily and relatively quickly realize it was in a particular area. Building elements that can be used as a specific marker in a local architecture include roof, gates, fences, pillars, and so on. In addition to aspects of form, a marker of architectural elements that are typical of the area can also be the building material, color composition, decorations or its layout.

Typical architecture of an area has special character or characteristics that distinguish it from other architecture in the other area. Typical architecture of the region can be interpreted as a physical reflection of the culture of the inhabitant in many aspects, such as behavior, activity, comfort, appearance, environment, and social life patterns. In addition to demonstrating ideological function, the typical architecture of the region expresses a marker (sign) and the life of inhabitants, which reflects the identity of themselves. Therefore, it is natural that the typical architecture serves as a regional icon.

In December 2012, a team from Heritage Conservation Office of Serang was documenting Sundanese traditional house, Bumi Alit Kabuyutan Lebak wangi-Batukarut, which is one of the typical architecture of the region in Indonesia. As we know, documentation is one of the spearheads of the preservation activities. Sundanese traditional houses, Bumi Alit Kabuyutan Lebakwangi-Batukarut, are located in Kampung Kabuyutan, Lebakwangi village, Arjasari district, Bandung regency, West Java Province, Indonesia. The coordinates are 107°36'10.3" East Longitude 07°02'46.6" South Latitude with a height of 710 m above sea level.

Based on the information from the manager of the custom house, the traditional village was founded in the 16th century A.D. by a figure from the Kingdom Galuh, one of the historical kingdoms in Indonesia. After many years, the traditional house, Bumi Alit Kabuyutan, has still been standing well, and the replacement of the building materials has often been done since most of the materials are made of natural materials that can not last long. However, management of indigenous Lebak Wangi-Batukarut retains authenticity and the techniques in its style.

To enter the traditional house environment, one must pass through a gate made of coconut pole with a saddle-shaped roof. Roof made of bamboo were halved, and each fitted with a superimposed manner. At the gate pillars are carved with floral motifs and a cleaver.

After passing through the gate, there is a path to the custom house, the construction made of a stone structure ± 110 cm wide. On the right and left there is a path lined with bamboo fence next to the gate before entering the custom house. Similar to the previous gate, this gate is also made from palm tree trunks and given a saddle-shaped roof.

The Sundanese custom house, Bumi Alit Kabuyutan Lebakwangi-Batukarut, faces north and has a length of 615 cm and a width of 500 cm. Like most traditional buildings in West Java, Indonesia, this building has a roof architecture known as *julang ngapak* roof. Roof construction of the building is in the form of wooden horses, while the rafters are from bamboo. The roof cover of this custom house consists of two layers of different materials, those are reeds and fibers. The section called *ngapak* roof is made of *talabap*, the bamboo parts are mounted by way of mutually superimposed.

The wall cover of the traditional buildings is made of woven bamboo and has an invisible wall around the window. Ventilation holes on this custom house are located on the roof of the kitchen, a gap that can be lifted so that the air circulates from inside or outside the building through the gap.

Entrance to the custom house is a sliding door made of woven bamboo. The core part of this building is the main room that also functions as a guest room, which is commonly referred to the core of the earth. In addition to the main room, there is a bedroom which is currently used for storing heirloom. Other space is *goab* for storing food. In this room there is a barrel to store rice. *Goab* coincides with bedroom in the south and *hawu* or kitchen. The kitchen is located on the north side, coincides with *goab*. In the kitchen there is a cooking stove and an oil lamp.

This custom home building floor is made of pounded bamboos, which are sequentially mounted *bahas*, and then *dolos*, and at the very bottom mounted *dagel*. To sustain the overall construction of the building, there are mounted poles made of bamboo, which stand on pedestals of jackfruit wood. In order to prevent termites and other insect actions, the entire building, including the bottom of the pedestals mounted on the bottom layer, is made of concrete sand.

In addition to custom house, in an environment that has a land of 112 *tumbak* wide or about 6250 m², there is a building called Bale Panglawungan, which is a building without walls and serves as a meeting place for ceremonies and other traditional events. This Bale Panglawungan is now a new building with the main construction of wood and the *joglo* -roof-shaped. *Joglo* is a roof structure that is common in Central Java. The old Bale Panglawungan no longer exists. According to the manager of the custom house, the original shape of Bale Panglawungan was a house on stilts, with a height of 1 m, where the structure was made of bamboo and the roof was covered with fibers.

In the yard around the house, there are some rare indigenous plants where Indonesian specialties are still preserved, such as plants *cariu*, *kimuni*, *gringsing*, *kiendang*, and *kiteja*. Thus, the managers of Bumi Alit Kabuyutan custom is not only preserve the traditional houses and their environment, but also the customs and traditions that have been going on for hundreds of years.



The traditional house of Bumi Alit Kabuyutan
(Documentation: BPCB Serang)



Path to the custom house
(Documentation: BPCB Serang)



The roof cover consists of two layers.
(Documentation: BPCB Serang)



Detail of the bamboo construction on the roof (the talahap)(Documentation: BPCB Serang)



Construction of the wall
(Documentation: BPCB Serang)



Sliding door
(Documentation: BPCB Serang)



Hawu or kitchen
(Documentation: BPCB Serang)



The black side is the bottom of the building
(Documentation: BPCB Serang)



Detail of pillars on the bottom
(Documentation: BPCB Serang)



Stair to entrance the house
(Documentation: BPCB Serang)



The new Bale Panglawungan
(Documentation: BPCB Serang)



Digital Documentation of Penang State Museum, Malaysia, Using Three Dimensional Terrestrial Laser Scan

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Introduction

Located at the UNESCO's World Heritage Site of George Town, the Penang State Museum was built in two phases; Phase 1 in 1896 and Phase 2 in 1906 when more funds were available. This two-storey Neo-classical building houses an exceptional collection of the early paintings of Penang Island completed by Captain Robert Smith; and showcases the cultural heritage of various ethnic groups who migrated to Penang during the late 18th Century. Over the decades, the building was occupied by various institutions including the Penang Free School (1896 to 1927); the Hutchings School (1928 to 1960); and the Penang State Museum (1962 to present). During the World War II, the right wing of the building which is located closest to the St. George's Church was bombed by the Allied, and the damaged section was never reconstructed until today. Due to its historical, cultural and architectural significance, the building was listed as a Heritage building by the Federal Government under the National Heritage Act 2005.

In early 2013, the Penang State Government allocated some funds to restore and repair the museum's porch, iron-grille masonry fence; and its surrounding landscape. The works were carried out in a period of three months from September until December 2013. Prior to the restoration and repair works, a dilapidation survey, an archaeological survey and measured drawings were carried out by the local consultants. In June-July 2013, the measured drawings of the entire building were produced digitally by a local firm, Geodelta System Sdn. Bhd. within a period of one month using a three dimensional (3D) terrestrial laser scan which incorporated a digital multimedia virtual tour of the building. The scope of the 3D terrestrial laser scan for the Penang State Museum included a 3D point cloud raw data collecting, point cloud data processing, 3D as-built modelling, measured drawing, animation and documentation.

Measured Drawing in Building Conservation

In building conservation, measured drawings or as-built scaled drawings are important documents not only to the client but also to the team involved in the conservation and repair works including quantity surveyor, architect, engineer, archeologist, conservator and building contractor. At times, the task of measured drawings are carried out conventionally using a measuring tape, scaled ruler or distance meter. Building sketches are sometimes drawn to illustrate the architectural and construction details. However, the level of accuracy of conventional measured drawings is somewhat questionable, especially when the building information collected is insufficient, incomplete or has measurement flaws. As time is a critical factor in building conservation, measured drawings ideally shall be produced in the shortest time possible with highly reliable, accurate and sufficient building details.

Thus, the use of a 3D terrestrial laser scan in heritage building documentations, particularly in the case of the Penang State Museum, offers several advantages in conservation works including swift turn around and high level of data accuracy; comprehensiveness of data collection, accessibility and retrieval; and maximum coverage of building area. The adoption of a 3D terrestrial laser scan for the Penang State Museum has set a new benchmark in the digital documentation of heritage buildings in Penang. The added features of a 3D terrestrial laser scan allow for the system to perform object or building measurement remotely and contactless, and to present the object or building information in point cloud form; such information is beneficial in both dilapidation and archaeological surveys prior to conservation and repair works.

3D Terrestrial Laser Scan

The 3D terrestrial laser scan is a ground based technique that captures the position and dimension of objects or buildings in a 3D format. It collects data in point cloud form through millions of laser pulses or distance measurements using a stationed laser scanner and a digital single-lens reflex camera. The output in each 3D point cloud is stitched by target coordinates collected by a total station, the overlapping of 3D coordinate points. Accuracy of the merging process is enhanced by increasing the number of targets. The data is then transferred to a high-resolution computer where it is converted into accurate 3D models. The high quantity and precision of the measured points generate a more realistic 3D illustration of objects or heritage buildings. The equipment used for the 3D terrestrial laser scan at the Penang State Museum includes Leica ScanStation C10 that features extremely fast scan rates up to 50,000 points per second; and Nikon D80 single-lens reflex camera equipped with fish-eye lens for panoramic photography that captures 360-degrees images on site. The former also includes surveyor-friendly and total station-like onboard graphic control that enables the user to view target scans in 3D.

Panoramic Photography

Panoramic photography is a technique of wide format photography using ultra-wide lenses or by stitching together several photos using software such as Photoshop or AutoStitch to capture images with elongated fields of view. With a sophisticated camera that rotates, panoramic images of aspect ratios 4:1 or sometimes 10:1 are captured at angles of 360 degrees. Panoramic photography technique was used to document the Penang State Museum as it captured everything at site. This feature is important as it permits the user to explore photo-realistic of 360-degrees scenes, allowing for an interactive experience similar to those of the actual site.

Panoramic images of the building were documented and processed for the digital multimedia virtual tour.

Methodology

The 3D terrestrial laser scan at the Penang State Museum was carried out in five stages which are Site Reconnaissance, Point Cloud Registration, Texture Mapping, 3D Modelling and 2D Drawing; and Animation and Documentation.

Site Reconnaissance

Site reconnaissance was conducted at Penang State Museum prior to 3D terrestrial laser scan. This stage is important to determine the placement of laser scanner, target placement, inter-visibility for 3D laser scanner and camera, lighting condition for panoramic photography, accessibility and connections between rooms and floors; and to foresee possible danger or hazard at site. Strategic scanning locations were pre-selected to ensure minimum onsite obstructions that could affect site scanning schedule and outcome. Any inaccessible areas around the building were analysed and resolved prior to the scan.

Point Cloud Registration

Based on the site reconnaissance, a total of 142 internal and external locations were identified at the Penang State Museum for the 3D terrestrial laser scan. Each location was given target placements with a special coding system and symbol which were used as target survey. Over 300 target placements were placed around the building including walls, columns, plasters, parapets, cornices, staircases, arches and along corridors. Each target placement was scanned using laser scanner and also photographed in panoramic images. Additional lightings were required to increase visibility in dark areas of the building interior. All captured data in 100% point clouds were imported using the Cyclone software that automatically registered the point clouds and produced a merged scan file. This process offers the most accurate and efficient way to define all target placements that would be useful in the subsequent merging process with the survey data.

Texture Mapping

Texture mapping is a technique to add detail, surface texture or color to a computer-generated graphic or 3D model. In the case of the Penang State Museum, all panoramic images captured onsite were processed to form a cubic image that featured six different view angles of front, back, left, right, up and down. The colour information generated from these panoramic images was applied to the point clouds to produce a true colour point option. Moreover, the collected false colour point clouds can be displayed in grayscale or by default, in scanner colour. In texture mapping process, special attention was given to building elements and details such as roof top, walls, columns, floors, beams, cornices, arches, keystones, balustrades, parapet, windows and fences.

3D Modelling and 2D Drawing

At this stage, the false colour of grayscale, ranging from pure white to pure black, produced by the scanner; and the true colour from the panoramic images were

digitally combined to create a 3D model of the Penang State Museum, or also known as an as-built model. Using a special algorithm built by Leica Cyclone suite, the 3D modelling was created via point clouds collected for each object surface and other built information. Details of the model, no smaller than 6mm, are the actual details of the building. The 3D model can be best viewed using Cyclone Viewer software. Based on the point clouds and a 3D model, a set of 2D measured drawings were then produced using the AutoCad software. The measured drawings consisted of site plan, location plan, floor plans, elevations, sections and architectural details. These drawings were fast-produced, accurate and easily available for both dilapidation and archaeological surveys.

Animation and Documentation

Using the Leica Geosystems Technology Truview software, a virtual tour platform was created for the Penang State Museum. The software allows for an intuitive viewing as a virtual tour is easy to measure, markup and hyperlink to other architectural links. It is also useful in displaying the point cloud via the offline or online version of Internet Explorer. The building can be animated for a walk-in virtual tour that features real panoramic images of ground and first floors as well as the building surroundings. For the purpose of digital documentation, virtual tour pages were developed to include panoramic images, locations of viewing points on the floor plan, and written description of the historical and architectural background of the building.

Final Deliverables

Using the 3D terrestrial laser scan, the final deliverables for the Penang State Museum include a set of measured drawings, panoramic photographs, 3D point clouds, 3D model of virtual tour, animation and final report. All digital documentation of the building were saved in a portable external hard drive for reference and archival purposes. Measured drawings were printed out and made available for the public. The Penang State Museum staff were trained by the local consultant on how to manage the filing data system, generate point cloud data; and view 3D modelling using virtual tour software.

Conclusions

The adoption of the 3D terrestrial laser scan at the Penang State Museum faced only minimum challenges at site. Some roof areas that could not establish a line of sight were observed from the nearby Hutchings Secondary School. Such observations were made during the school operating hours. Additional lightings were required to increase visibility in dark areas of the building, mainly within the pitched roof structures. Despite these minor challenges, the 3D terrestrial laser scan has succeeded in producing fast and accurate measured drawings which were useful for onsite surveys such as dilapidation and archaeological surveys; and conservation and repair works. It has saved time and financial resources in documenting important heritage data. The utilisation of a 3D terrestrial laser scan for the Penang State Museum has set in a new benchmark in the documentation of heritage buildings in the UNESCO's World Heritage Site of George Town; and also Heritage buildings listed under

the National Heritage Act 2005.

Acknowledgements

Thank you to the Penang State Government particularly the Penang State Economic Planning Unit, Penang Public Works Department and Penang State Museum; Arkitek Urbanisma Sdn. Bhd., Geodelta Systems Sdn. Bhd.; and USM LRGS Local Knowledge Project 3 Team (LRGS/TD/2012/USM-UKM/KT/03) for making this project and article possible.

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Geodelta System Sdn. Bhd. (2013), *Final Report on Documentation of Penang State Museum Using Terrestrial Laser Scanning Method* (unpublished).



Built in two phases (1896 and 1906), the Penang State Museum was previously occupied by the Penang Free School (1896 to 1927) and the Hutchings School (1928 to 1960).



With a special coding system and symbol, external and internal target placements were scanned using stationed 3D terrestrial laser scanner.



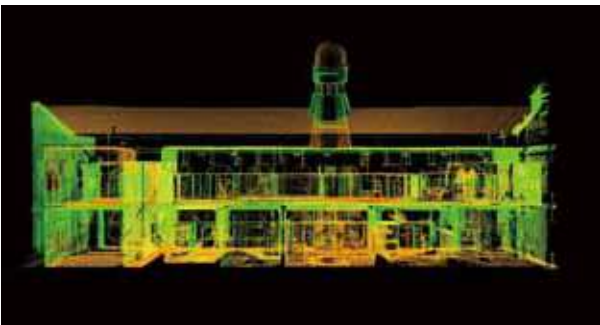
3D terrestrial laser scanner is placed inside the building to collect data in point cloud form through millions of laser pulses or distance measurements.



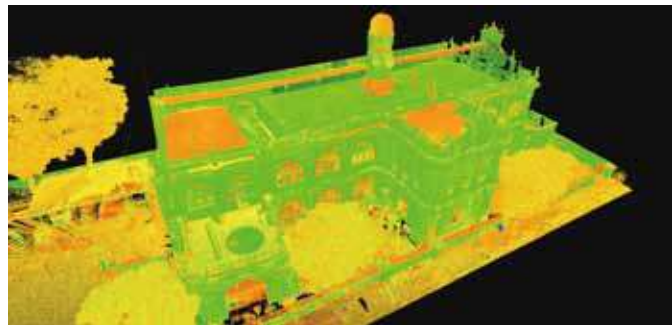
Panoramic photography technique was used to document the building as it captured everything at site.



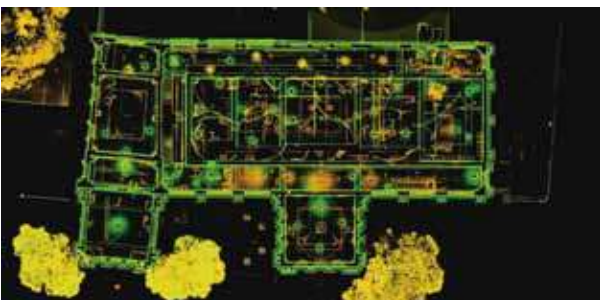
Panoramic image of the building interior permits the user to explore photo-realistic of 360-degree scenes, allowing for an interactive experience similar to those of the actual site.



Internal view of the building in 3D point cloud



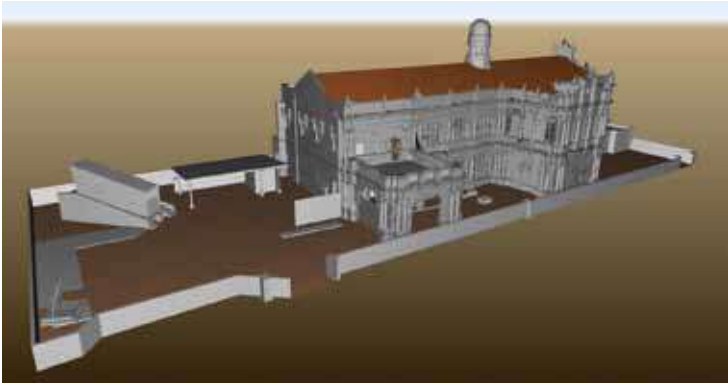
Aerial view of the building in the 3D point cloud



Top view of the building in 2D point cloud



Colour information generated from panoramic images was applied to the 3D point clouds to produce a true colour point option.



3D model of the building showing its external facades and surroundings



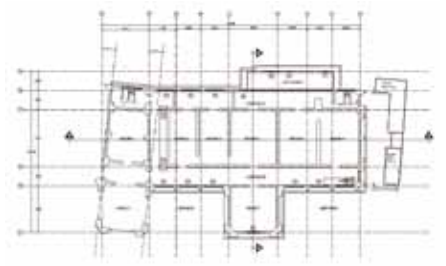
A virtual tour platform was created using Leica Geosystems Technology Truview software that allows for an intuitive viewing.



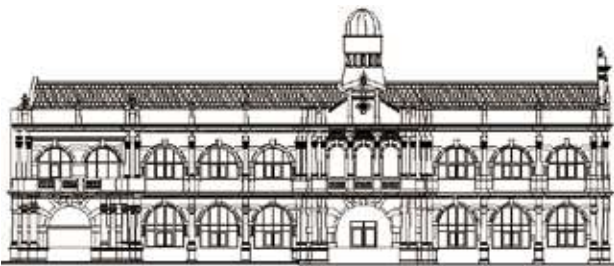
A virtual tour page was developed to include panoramic images, locations of viewing points on the floor plan, and written description of the building background.



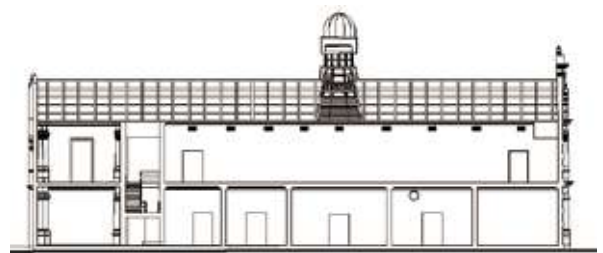
The front elevation of the building in true colour of point cloud



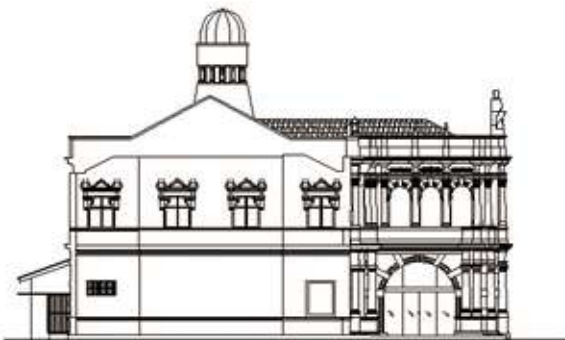
Based on the point clouds and a 3D model, a set of 2D measured drawings including this ground floor plan were produced using AutoCAD software.



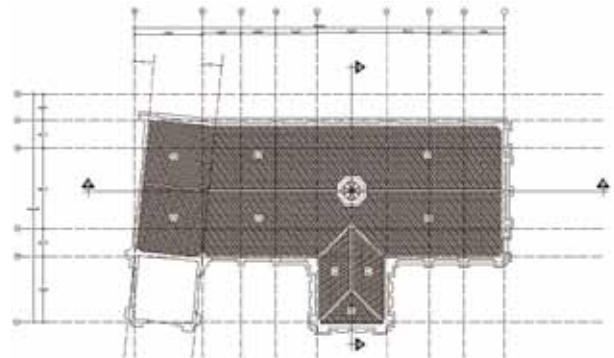
The front elevation of the building showing the architectural elements and details



The sectional elevation of the building showing the internal floor beam, staircases, columns, ceiling and roof structures



The east elevation of the building showing the front porch and its main entrance



The roof plan of the building showing its main pitched roof



Test Excavations Carried Out at A. Dh Fenfushi and HA. Ihavandhoo for “Coral Stone Mosques of Maldives towards World Heritage List” Project

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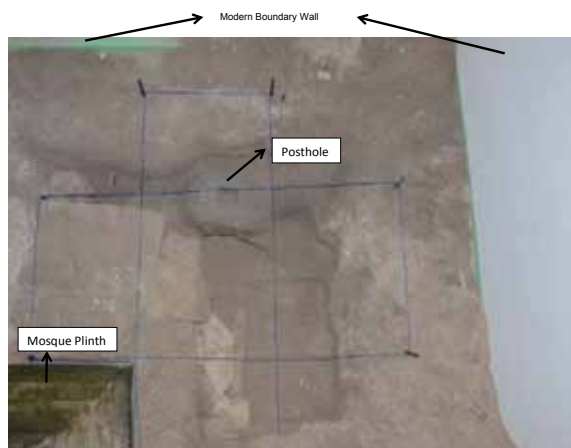
Upon the acceptance of the UNESCO World Heritage Convention in 1986, the government of Maldives has been carrying out enormous number of works to nominate a Maldivian site to the UNESCO World Heritage List. Today, due to some countless number of works, Maldives is about to accomplish this task. We are now on the verge to submit a series of Coral Stone Mosques to the World Heritage Centre. This report, thus, will look at the test excavations (one of the many components) carried out for this project. Test excavations for each of the five mosques have been carried out and this report will look at two of the excavations carried out in A. Dh Fenfushi and HA. Ihavandhoo Ancient Mosque.

The first excavation was carried out at A. Dh Fenfushi Ancient mosque. The excavation was carried out with the help of our international expert, Mr. Munish Pandit/ Conservation Architect from India. Upon inspection of the mosque area, it was decided to excavate the north east corner of the mosque. An “L” shaped trench was made and excavated. Note that the trench was made right after the last visible row of coral stone blocks of the plinth of the mosque. Excavation work took two days while photography, drawing and reburying of the trench took another two days. The trench was further divided in to two quarters one at the Eastern side and one at the Northern side. Excavations were carried out separately at the two quarters, eastern quarter being the first. At the eastern quarter, we found three layers of damaged coral stone blocks placed right below the mosque’s plinth (the foundation stones of the mosque). Further excavations revealed a round/ oval shaped coral stone block (30cm in height) few centimeters away from the coral stone layer. This block had a rectangular cut (1-2 inches deep) made on the top center measuring 5 by 4 inches. Upon further investigation of the cut, we found marks and patterns of wooden pillars inside the cut. Therefore it was suggested that this was a posthole and that at one time wooden

pillars may have been placed around the mosque to hold the roof structure of the mosque. Other round coral stone blocks were also discovered right next to the posthole.

To confirm the posthole theory, we dug the opposite corner (south west) of the mosque. Unfortunately we were unable to find any postholes there. However, we found a coral stone block similar to the blocks used in the front wall of the mosque (cut, carved and designed) buried under the foundation stones in the center of the back side (north) of the mosque. We also found large quantities of red oxide and few shells from this trench. The excavation of the Northern quarter also had three layers of coral stone blocks as the foundation stones and we found few shells and live roots within the soil. Nothing significant was found within this quarter. Due to limited time and resources, we decided to call it an end to the test excavations at this site when we reached the third layer of the coral stones. An important note to consider at this site is that the locals have recently constructed a boundary wall very close to the mosque complex. Therefore, the absence of a posthole in the south west corner of the mosque might be that it was removed while the locals were working on the boundary wall. The whole concept of the mosque having pillars at each corner as support for roof structure during earlier times remains questioned and need further testing.

The initial work at HA. Ihavandhoo Ancient Mosque had to be carried out slightly differently as the main mosque was surrounded by ceramic tiles. Therefore removal of tiles had to be done first. Upon inspection of the mosque area, it was decided to excavate the north east corner of the mosque. An “L” shaped trench was made and excavated. Note that the trench was made right after the last visible row of coral stone blocks of the plinth of the mosque. Excavation work took three days while photography, drawing and reburying of the trench took



A. Dh Fenfushi Ancient Mosque: View of the Trench from the top



A. Dh Fenfushi Ancient Mosque: View of the Trench from the top

another two days. The trench was further divided in to two quarters one at the Eastern side and one at the Northern side. Excavations were carried out separately at the two quarters, eastern quarter being the first. At the eastern quarter, three layers of blocks were visible while the fourth layer consisted of dark colored wet sand. The first layer was the sandstone layer which was very disturbed. Many coral stone fragments were also at this layer. Cement fragments were also present in this layer, probably left during the work of placing tiles. The second and third layer were also made of coral stone but showed a change in the soil from coarse rubble sand to fine, dark sand. The soil had a rather wet texture which followed to the fourth and final excavated layer. Artifacts were also found from this layer. Many shells were also found from this layer.

Excavations at the northern quarter revealed a much worked on coral stone wall that stretched from either ends of the trench. Due to the limitations of the excavation, we were unable to find out the thickness



HA. Ihavandhoo Ancient Mosque: View of the Trench from the top

of the wall. Upon interviewing the elders of the island, a possible assumption was made for the wall being a later addition to the mosque. According to the locals, the mosque used to have a boundary wall. Therefore, it could be that this is the ancient boundary wall. We know that the wall is placed right next to the foundation stones at the backside of the mosque, however, we do not know yet how far/close it has been placed at the other three sides. Locals say it was placed a bit further at the other sides. The site was measured, photographed and drawn accordingly.

According to the locals, the surrounding area of the mosque building used to be part of the cemetery and during the work of placing ceramic tiles, they found human bones. They suggested that the bones found were from a family buried there. So there might be the possibility of discovering bones if dug further.

A mound located in the north west corner of the mosque area was assumed earlier to be a bathing tank. However, upon many observations and interviews with local elders, no one mentioned such a remain to have been seen there. Most of the accounts direct to a well being there. The interviews suggested that there used to be four wells in the mosque area, one at the front, two at the south west side and one at the north west side. One well is still visible at the south west side. Some stones have been piled up and visible at the north west side as well. They include parts of tombstones as well. Artifacts found include ceramics, pottery, and clay tiles for roofing, shells and bird/fish bones.

In conclusion, this mosque also had a similar foundation with coral stone blocks projecting outwards from the original plinth of the mosque. Apart from the foundation, a worked on wall of coral stone and lime plaster was found next to the foundation and it goes along the backside of the mosque wall. We think that this might be the ancient boundary wall of the mosque but further excavations are necessary to confirm this.



Artefacts found at HA. Ihavandhoo Ancient Mosque



Pohnpei HPO Seeks to Train Community Members as Ground Surveyors and Kosrae HPO Incorporates Incomplete Excavations as Museum Sites

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Pohnpei State Historic Preservation Office

As the current preservation efforts toward tangible cultural heritage sites continue, the Pohnpei State Historic Preservation Office (PHPO) is expanding their inventory to stretch the entire main island of Pohnpei. The objective is not only to create a more comprehensive inventory but also to increase community involvement in the process. Pohnpei has five main municipalities and PHPO will be training at minimum five community representatives to conduct ground surveys. These representatives will be on a one year contract basis, taught in the documentation of site dimensions on hardcopy maps and the logging of the sites with GPS points (later to be added to the PHPO digital map of Pohnpei). Upon the successful completion of the contract, PHPO aims to extend their efforts to the outer islands of Pohnpei. All sites will be inventoried and the designated board will be tasked to review their nominations into the Pohnpei cultural heritage site registry.

It is the general assumption that the efforts of PHPO is in response to the general duties of the nature of their office, though it is this author's belief that these contracts will lead to an increase in the ownership of such sites by the local communities in their practical applications at cultural preservation.

In regards to my entry in the 12th International Correspondent Report on the utilization of X-ray Fluorescence (XRF) on the stones of Nan Madol, the University of Otago, NZ, field team comprising of Dr. McCoy and his students are on their way to concluding their analysis. The second item regarding the updated and GPS verified map of Nan Madol will be available early 2014 and made available for public viewing.

Kosrae State Historic Preservation Office

Kosrae State Historic Preservation Office (KSHPO) staff and archaeologist Adam Thompson have conducted surveys and found evidence to signify the shift of the Tofol valley from saltwater lagoon to a freshwater swamp. Interestingly, their findings happened to be at a location where two separate groups of structures were found, both erected at two different time periods.

KHPO staff has located sites within proximity to the Kosrae museum, and after survey and proper documentation, they have excavated the site incompletely. This was done on purpose. The incomplete excavation of the sites exposes stone alignments within the center of platforms. Visitors to the Kosrae museum will tour these sites as part of an outdoor exhibit, using the opportunity to introduce archaeological survey to the general public. Absent of tertiary Archaeology courses in the FSM, this effort to expose students and the local community to archaeology is a commendable one.





A Unique Memorial Complex from Ancient Turkic Period Discovered In Eastern Mongolia

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Mongolian Academy of Sciences, Institute of Archaeology

In September 2011, Dr. Ts. Bolorbat who is a researcher of the Institute of Archaeology, Mongolian Academy of Sciences discovered some runic inscriptions in stone steles of an Ancient Turkic memorial complex including many stone slab remains with rosette ornaments, participating in a team fulfilled an archaeological survey in the territory of Tuvshinshiree soum, Sukhbaatar aimag (BOLORBAT & MUNKHTULGA, 2013).

The memorial complex is situated in a little plateau named Dongoin Shiree, which extends from the north-west to the south-east, and about 50 km to the north from the center of Tuvshinshiree soum (Fig. 1).

During 5-10 June 2013, a team of the Institute of Archaeology led by Dr. B.Tsogtbaatar did the preliminary epigraphic research at the site, taking rubbings and photographs (MUNKHTULGA & ŌSAWA, 2013a).

In 12-18 June, 2013, the author and Takashi Osawa, who is a professor of Osaka University, Japan, determined that there were 2832 characters and 646 words in 20 lines in the two steles, reading the inscriptions firstly (MUNKHTULGA & ŌSAWA, 2013a).

When we observed the texts again in 8-18 August, it was also clear that the third stele had been inscribed and the three steles had 3857 characters, 1193 words and 86 tamgas. We copied runic texts into computer and made transliteration, transcription, and translation from Ancient Turkic into modern Mongolian, notes on some words, description of the tamgas and conclusion. (MUNKHTULGA & ŌSAWA, 2013b) The inscriptions are written in Ancient Turkic language. Such expressions as “:ebim e:” (“Oh, my house!”), “:begim e:” (“Oh, my lord!”) and “:yerim e:” (“Oh, my country!”) had been engraved repeatedly on the surfaces of the steles in memory of the deceased person. The above praying words in the epitaph look like ornaments to pattern the giant steles (Fig. 9). The tamgas have been depicted before the writing of the inscription and might have been engraved by people who came to participate in offering ceremony (Fig. 6, 9).

From 21 September to 11 October, 2013, a national expedition ruled by professor, Dr. D.Tseveendorj who is director of the Institute of Archaeology, MAS carried out an excavation at the site (BOLORBAT & MUNKHTULGA, 2013) (Fig. 3, 5, 10). Some specialists of the Institute of Astronomy and Geophysics participated in this expedition and made geophysical graphics, which after were used for our excavation (Fig. 2).

30 more parts of steles and slabs were uncovered and documented by this excavation work (Fig. 4, 5, 7, 8). It is possible that almost all the newly-found steles have inscriptions or tamgas (Fig. 6, 9).

An important discovery of the excavation is an inscription of Khitan small script written in 2 lines with black ink on one of the newly-found steles. Only such the logograms have been recognized preliminarily as ‘is’ or numeral ‘nine’, ‘û’ and ‘ku’ due to its preservation (KANE, 2009. 27, 29).

There have still not been found such the Ancient Turkic complex as contained so many huge inscribed steles not only in the territory of Mongolia, but also in Eurasian Steppes (BAYAR, 2003. 156; VOITOV, 1996. 8). Also, there was never discovered an Ancient Turkic aristocratic complex with steles in Eastern Mongolia (BAYAR, 2001. 110; VOITOV, 1996. 12). It is the first appearance that the Khitan small inscription revealed from Ancient Turkic memorial complex.

It is possible to suggest that the monument of Dongoin Shiree was established around 735-745 AD in memory of a nobleman (noblemen) who was (were) ranked after khagan and dwelled in eastern steppe zone of the Second Turkic Khaghanate, based on the linguistic characteristics of the texts, shapes of the tamgas, representation of the slabs of enclosure and basic structure of the complex (Fig. 4, 6).

Both of the engraving runic inscription on old monument with tamgas and writing Khitanese sentence in Turkic one indicate that a ritual to write on an ancient stele was so important in political activities of the conquerors in Medieval Inner Asia.

In 924, Khitan emperor Abaoji carried out a large expedition against the local Tsu-pu tribes and arrived in Ordu-Balyq, the Old Uighur city in Orkhon valley. “He ordered that the old stone tablet of Bilgä Khagan be erased and reinscribed in Ch’itan, Turkic, and Chinese to commemorate his meritorious deeds” (WITTFOGEL & FÊNG CHIA-SHENG, 1949. 576; PERLEE, 1959. 69). Although the stone tablet was not found by the recent archaeological researches (HÜTTEL & ERDENEBAAT, 2009. 20, 62), mid XIIIth century Persian historian Juvaini mentioned that outside the ruins of the palace of Ordu-Balyq, opposite to the gate, there lay stones engraved with inscriptions, which he had seen. During the reign of Ögödei Khagan (1229-1241 AD), those “stones were raised up, and a well was discovered, and in the well a great stone tablet with an inscription engraved was upon it. The order was given that everyone should present himself in order to decipher the writing; but no one was able to read it. Then people were brought from Khitai who are called ... it was their writing that was engraved on the stone” (JUVAINI, 1958. 54-55). Thus the new masters of the Mongolian Steppe often tried to show the local people that they could succeed the mandate of heavenly power.

It should be said that the monument of Dongoin Shiree can be an evidence to socio-political, ethnic and cultural studies on the Tölis tribes or the eastern army-political wing of the Turkic Empire of the second quarter of the VIIIth century AD, and the inhabitants of the north-western region of the Khitan (Liao) dynasty (925-1125 AD).

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Fig. 1. Location of the site of Dongoin Shiree



Fig 2. Geophysical research at the site of Dongoin Shiree



Fig. 3. Excavation at the site of Dongoin Shiree



Fig. 4. Excavation trenches at the site

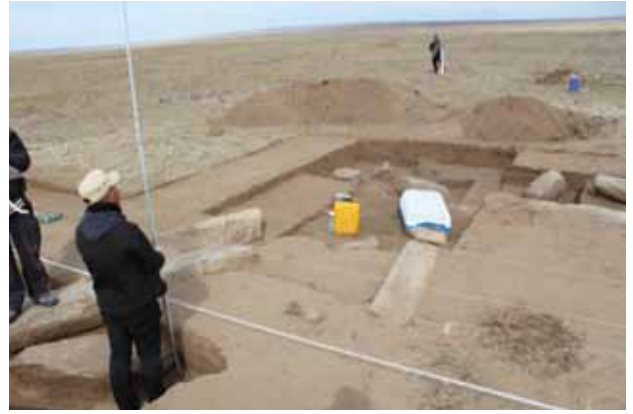


Fig. 5. Measuring process



Fig. 6. Tamgas on a stone stele



Fig. 7. Preparing for rubbing of a stele



Fig. 8. Taking rubbing of a stele



Fig. 9. Rubbing of a stele with inscription and tamgas



Fig. 10. Some members of the national expedition worked at the site of Dongoin Shiree



People's Involvement in Heritage Conservation in Nepal (Shantipur Temple Conservation Project - Swayambhu Protected Monument Zone)

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Introduction

The Swayambhu Stupa is one of the most important and oldest monument of Kathmandu valleys, which is still worshipped by many people not only from the country but from the many countries of the world. It's the tranquility between the Buddhist and Hindus and the symbol for the world peace. There is no inscription and any other evidence about the exact date of its construction, but some of the inscription says that some parts of the stupa was reconstructed in the medieval period (13th–16th Century AD) and there were many conservation work done in the medieval period as well as in the Rana period (18th–19th Century AD).

The Shantipur Temple is also the most significant Buddhist temple not only for the Buddhist but for all religious people in the world. According to *Swayambhu Purana* (a holy text), Shantipur was established by Shantikaracharya, when he established seven *Puras* in Swayambhu Stupa area and he took *samadhi* in the same temple–Shantipur. The *pura* constructed by Shantikaracharya was latterly named and known as Shantipur; so it is believed that the Swayambhu Stupa and Shantipur Temple was constructed in the same period as per the *Swayambhu Purana*. However, there is not any evidence on the exact date of construction of this temple as well, but it was very popular in the medieval period as a popular Buddhist education and meditation center as well, so it is said that the temple must have been constructed before or during the Lichchhavi period (4th–9th Century AD). But there is no full documentation about the construction and conservation/renovation work of it, except a few documents only with incomplete information.

The temple is directly linked with the *Vajrayana* sect of Buddhism; the different documents say that *Vajrayana* was flourished in Nepal during 9th–10th Century AD, so it is imagined that Shankaracharya constructed this temple around 10th–11th Century AD. After that the temple was renovated numerable times. The architecture of the temple and different iconographic characteristics of images in and around the temple also indicate that the temple should be established during the pre-medieval period (11th–12th Century AD); however the current architecture of the temple is after the renovation work, during destruction by the great earthquake in 1934 AD in Nepal, when numerable monuments were demolished and destroyed. So, the present building (before the currently on going conservation work), at first glance, does not seem to be either a tantric shrine or a temple in terms of its architecture, which is hybrid architecture came out during the renovation after the afore-mentioned great earthquake. The main façade of the temple indicates that the temple might be *Shikbara* style in origin, which is similar to the *Pratapapura* and

Anantapura, constructed latterly by King Pratap Malla during his reigning time, which are also very close to the Swayambhu Mahachaitya.

It is already mentioned that the temple was not renovated in a proper way of conservation during the post-earthquake renovation time, for it was just covered by the roof. It was not the matter at the time that whatever architecture of the temple might be, and the matter only might be the protection of the remaining structure of the temples in largely all over Nepal just after the earthquake. It was the question from everyone that Shantipur did not seem a temple architecturally, especially in Nepalese context. However, the present architecture itself has spent nearly a century; and it was in the situation to be urgently done something physically to preserve this precious heritage. So, this conservation work has been going on.

Shantipur Temple Conservation Project

The Federation of Swayambhu Management and Conservation (FSMC) prepared a conservation notes and submitted an application for granting urgent permission for Shantipur Conservation Project to the Department of Archaeology (DoA) in May 2013. According to the application submitted to DoA, it was stated that the expenses for doing all would be funded by FSMC, and requested to DoA for the technical support for archaeological conservation work to the project.

After the detail study and several discussions with the FSMC, Department of Archaeology had decided and had given permission to FSMC. It was stated that however the FSMC is funding for the whole project, project work must be under the supervision and guidance of DoA on each conservation work except the financial part and FSMC will be responsible for reporting and everything corresponding to the government agencies.

In the beginning, the objective of the project was to provide adequate maintenance and change the roof material, such as using copper sheets instead of zinc sheets, which was in the worst condition.

Secondly, its objective was to conserve the wooden structures which were used for roof; i.e. beams, rafters, eave boards etc. When the roof was opened almost all of the wooden elements were completely rotten and it was supposed to be collapsed the whole roof very soon. So, it was decided to be changed with new wooden elements, but if the wood should be used if there are reusable elements.

In such a way, the FSMC, a dedicated institution for safeguarding Swayambhu was contributed themselves to conserve the holy temple of Swayambhu and initiated the local people as well as all of the related government agencies for funding and doing such a larger project regarding to heritage conservation in Swayambhu.

People's Involvement

Department of Archaeology, the sole authority of the Government of Nepal, in relation to cultural heritage conservation and management, was directly involved in this project that it had issued a permission letter for the conservation of Shantipur temple and deputed an official representative (the writer) for the entire project. In the first meeting with FSMC, a Steering Committee was formulated as per the request by the representative from DoA, which included related government and non-government agencies as well as the local institutions and people; which consisted the Representatives from FSMC, Department of Archaeology (DoA), Kathmandu Metropolitan City (KMC), District Administrative Office (DAO), Guthi Corporation, Central Headquarter office, 15 Ward Office of KMC, Swayambhu, Swayambhu Police Office, Buddhacharya Pariwar and Locals.

There were 11 members in the Steering Committee that had been monitoring all the project work; however, the DoA was responsible for the technical conservation work. The temple had been protected by the religious community since the time memorable, so there were several prohibitions for doing conservation activities as well. Only the *Dixits* (the graduates in their own tantric religion–Vajrayana Buddhism) could enter into the temple, which was the difficult part for the project, however; the youths from the community who were *Dixit*, had been doing all the works inside temple. They also were much happy about being involved directly to the conservation works of their own heritage. Another sub-committee of the locals and the *Dixit* youths had also formulated to support in day-to-day regular conservation work as well as in documentation, which was also guided by the representative from DoA.

The Shantipur temple conservation project started its work from the end of July 2013 and the one third of the conservation work of roof had been completed within the first week of October 2013. During the conservation of roof, observation was seriously taken for the possibilities of other archaeological conservation work in the temple. All the walls (wall breadth 42 inches lime-surkhi mortar in brick) are now in an intact condition with their strength. The locals and communities are very happy with conserving the temple that they are directly involved in day-to-day work, learning the heritage conservation process and documentation process as well.

Conclusion

People's or the community's involvement in heritage conservation and/or management is rare in Nepal and in the world as well. The reason on this regard is a matter of economic benefit and lack of knowledge on heritage conservation. The high educated communities also ignore preserving their heritage because they focus and get involved into the economically benefitted activities than in the activities of heritage conservation. But enhancing the knowledge on heritage, the communities learnt lessons that heritage is only the major source for earning in their life in Swayambhu, however it is an indirect benefit rather than their occupational activities. So, they are very much interested in preserving the precious heritages in and around Swayambhu Protected Monument Zone. The community was very much actively involved during the

Swayambhu Stupa Renovation Project (2008–2010) and in the same way, they have been very actively involved in this project in different ways; which is very admirable and much interested for the government agencies for heritage conservation and management.

In this project, the locals who are *Dixit*, fully involved in doing everything for the conservation of Shantipur Temple. There is no way without their involvement as it is completely prohibited to enter into the temple for anyone except the *Dixit* as per their tradition. Similarly, non-*Dixit* locals are also actively involved in this project on different working activities of conservation; all the workers except major carpenters and artisans are from the local communities, mostly volunteering for conserving their precious heritage.

This would be an exemplary project on people's involvement in heritage conservation for the other communities in the country as well in the universe. However, the conservation work is not for once but is continuous activities, which should be known and owned by the local communities and feel themselves as their pride on it. Then, it would be continued and preserved for the next generation.

After the completion of the project, the temple would be in a good shape for a traditional architecture; however a bit different due to its present architecture, and no one would question again that Shantipur Temple does not seem as a temple by architecturally.

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1. Before conservation of the roof



2. During the conservation



3. One part of the roof after taking off zinc sheets



4.Thickness of wall



5. Covering to protect from rainwater: during conservation work



6. Rotten one of teh beams



7. Preparing rafters for new roof



8. Using tradintional techniques: reuse of older wood



9. Wooden planking for copper sheet roof



10. Using water proof material : just above the wooden planking



11. Copper sheets: final roof (above water proof material)



12. One side complete roof work



13. Nago head, eve board and jhallar (decoratives)_after completing roof conservation work: one side



14. A partial completed roof conservation work



15. Two sides partially (one third) complete roof conservation work



International Archaeology Day at the Otago Acclimatisation Society 1868-1885 Opoho Fish Ponds (NZAA Site No. I44/490).

Dr Matthew Schmidt, *Regional Archaeologist Otago/Southland*
New Zealand Historic Places Trust

Introduction

My previous International Correspondent report on the 1868-1885 Opoho Fish Ponds described the discovery and initial investigations of this site. It also described how the ponds were to become part of a mountain bike trail and provide a recreational/heritage experience for riders and walkers. This report provides an update on further heritage management work at the ponds which were undertaken as part of International Archaeology Day on 19 October 2013. International Archaeology Day is an initiative by the Archaeological Institute of America which aims to bring archaeology to the public so as to promote and educate people on the work undertaken by archaeologists and cultural heritage professionals. In addition to the ponds being part of a mountain bike trail, they will now become part of the 150th Anniversary celebrations of Fish & Game Otago (the successor to the *Otago Acclimatisation Society*), in 2014.

Background to the New Zealand Acclimatisation Societies

In the late 1860s, various *Acclimatisation Societies* around New Zealand began to experiment with the introduction of various European and American faunal species so as to provide terrestrial food resources for the growing colonial population. The introduction of fresh water sport fish was one of the key aims of these societies so as European/Pakeha inland populations had a reliable source of fresh fish. Hence in 1867, the Government introduced the *Trout and Salmon Protection Act 1867* which made provision for “*the preservation and propagation of Salmon and Trout in this Colony*”.

The *Otago Acclimatisation Society* Fish Ponds at Opoho Creek, Dunedin, were therefore built as a result of the Colonial Government's aim of populating the fresh water environments of the Otago region with sport fish. These ponds, built in 1868, are believed to be the origin of the first successful release of Brown Trout (*Salmo fario*) in New Zealand. This event, alongside the later successful release of other sports fish, has resulted in trout fishing in New Zealand becoming a major contributor to the tourism industry today, with the Mataura River in Southland being considered the best river in the world for brown trout fishing.

Brief History & Re-discovery of the Fish Ponds of the Opoho Fish Ponds

The Fish Ponds at Opoho were built in 1868 for the purpose of establishing a viable fresh water sport fishery in Otago. From these ponds brown trout (*Salmo fario*) and other species of foreign fresh water fish were hatched and grown for release not only in Otago, but in other locations around the South Island. The ponds were so successful that between 1868 and 1885, local newspapers the *Otago Daily Times* and *Otago Witness* followed the development and successes of the hatching process and fish rearing at the ponds through publication of *Otago Acclimatisation Society* articles and meeting minutes. In 1885, the hatchery was deemed too small and a new hatchery was built further up the Opoho Creek gully. This larger hatchery continued the success of the first

hatchery and was a noted tourist destination for visitors to Dunedin in the late 19th and early 20th centuries.

The Fish Ponds were brought to the attention of the New Zealand Historic Places Trust (NZHPT) in January 2011 by Mountain Biking Otago track builders working on a community recreation bike track located in native bush next to Opoho Creek in Dunedin (Figures 1, 2 & 3). This fortuitous re-discovery meant that this significant heritage site for the history of the introduction of fresh water game fish in New Zealand could be examined and investigated and decisions made on its preservation and future management. Since 2011, vegetation in and around the ponds has been cleared and the Lower Pond has had some of the fill removed on two occasions to ensure the structure did not deteriorate further (see the previous report which describes the archaeology of the ponds and their history in detail).

International Archaeology Day – 19 October 2013

International Archaeology Day provided an opportunity for further investigation and management of the ponds and the chance for volunteers from Fish & Game Otago, Mountain Biking Otago, the University of Otago, and some young budding archaeologists, to do hands-on archaeology.

A total of 15 volunteers met at the site and all were supplied with buckets, trowels, half-shovels, loppers, secateurs, shovels and spades to clear vegetation and remove fill from the ponds (Figures 4 to 6). Much of the equipment was supplied by archaeologist Phil Latham, Archaeology Laboratory Manager for the Anthropology Department at the University of Otago, who also volunteered his time on the day.

The first task for the volunteers was to clear vegetation around the two ponds using secateurs and loppers (Figure 7 & 8). Volunteers were shown how to clear the vegetation without damaging the stone work ie. not to pull the vegetation from the stonework but to cut it flush to the stone surface, and where to step to ensure the fabric of the site was not damaged during the work (Figures 9 to 12). Fallen trees and trees and shrubs growing in an around the ponds were cut by Hamish Seaton of Mountain Biking Otago, a skilled chainsaw user (Figures 13). These were then removed from the site and deposited away from the wider area of the site.

The volunteers removed an extensive amount of vegetation exposing a significant amount of archaeology in the process. The outlines of the Upper & Lower Ponds could now be clearly seen, the dimensions of the small hut ruins above the Lower Pond could be ascertained, and a set of stone steps leading down to the creek near the Lower Pond were revealed (Figures 14 to 17).

The next task involved removing fill from the ponds, exposing and cleaning stonework and determining the nature and extent of the access terraces around the ponds. Volunteers were shown how to excavate fill from

the ponds in an even and regular manner so as any artefacts or features revealed could be recorded according to their depth; how to follow a line of stonework using a trowel, half-shovel and brush to expose the extent and form of the feature; and how to clean moss and dirt from pitched stonework so as not to affect the mud 'mortar' joins between the stonework.

Excavations of the Lower Pond exposed all the pitched stonework of the structure down to the base of the pond (Figures 18 to 25). Excavation of the smaller Upper Pond was not completed but successfully uncovered the shape and the depth. In contrast to the larger Lower Pond, the Upper Pond also appeared to have stonework around the walls, in its base and along the upper lip, but the stones around the walls and in the base were large and not systematically laid (Figures 26 to 29). Only where the water exited the pond in a small flumed water race (fluming was found in the top soil in the exiting water race feature) on its way to the Lower Pond was the stonework placed in a planned manner. It is possible that the wall and base stones were placed randomly in the pond to provide shelter or hiding places for the young fish, the pond itself being made of dirt and gravel. A test pit dug in the centre of the pond showed that the pond did not have a stone base. Further excavation of the Upper Pond is required to complete its management which will confirm how stones were used in its construction.

The extent of the access terraces leading around the edges of the ponds was also uncovered. Although a previous investigation of the terraces around the ponds showed that these access terraces were probably pebbled, this fragile layer was not excavated from beneath the thin layer of topsoil. Exposing the pebbling would possibly

have created a management issue from visitor foot traffic.

All artefacts encountered were found in the fill which had built up in the ponds over the last 128 years. These consisted of 20th century bottle glass in the upper ca. 30cm with nineteenth century bottle glass, pieces of galvanised iron for fluming and Welsh purple roofing slate found below this depth to a maximum of ca. 90cm deep in the Lower Pond.

The size of the small hut as well as how it was constructed using river cobbles and a mud mortar was determined through careful excavation (Figures 30 to 32). The excavation did not suggest a purpose for the hut at the top of the Lower Pond, however, water certainly flowed through the middle of the building from the water race leading from the Upper Pond. A small stone alcove on the north side of the structure which appeared to be the remnants of a chimney for a fire place did not appear to have been built for this purpose. Its function is as yet unknown. Finally, a set of four stone steps were found ca. 5m from the bottom left side of the Lower Pond leading to the creek (Figure 33). These would have been used to gain easy access to fresh flowing water.

Conclusions

The use of volunteers as part of International Archaeology Day to further investigate and manage the Opoho Fish Ponds, and to provide a hands-on experience of archaeology, was very successful. As the archaeology of the ponds was simple in terms of its fabric and construction, it was a good choice to introduce volunteers with little or no experience in archaeology to participate in a cultural heritage project. The work undertaken exposed more of the layout of the pond complex

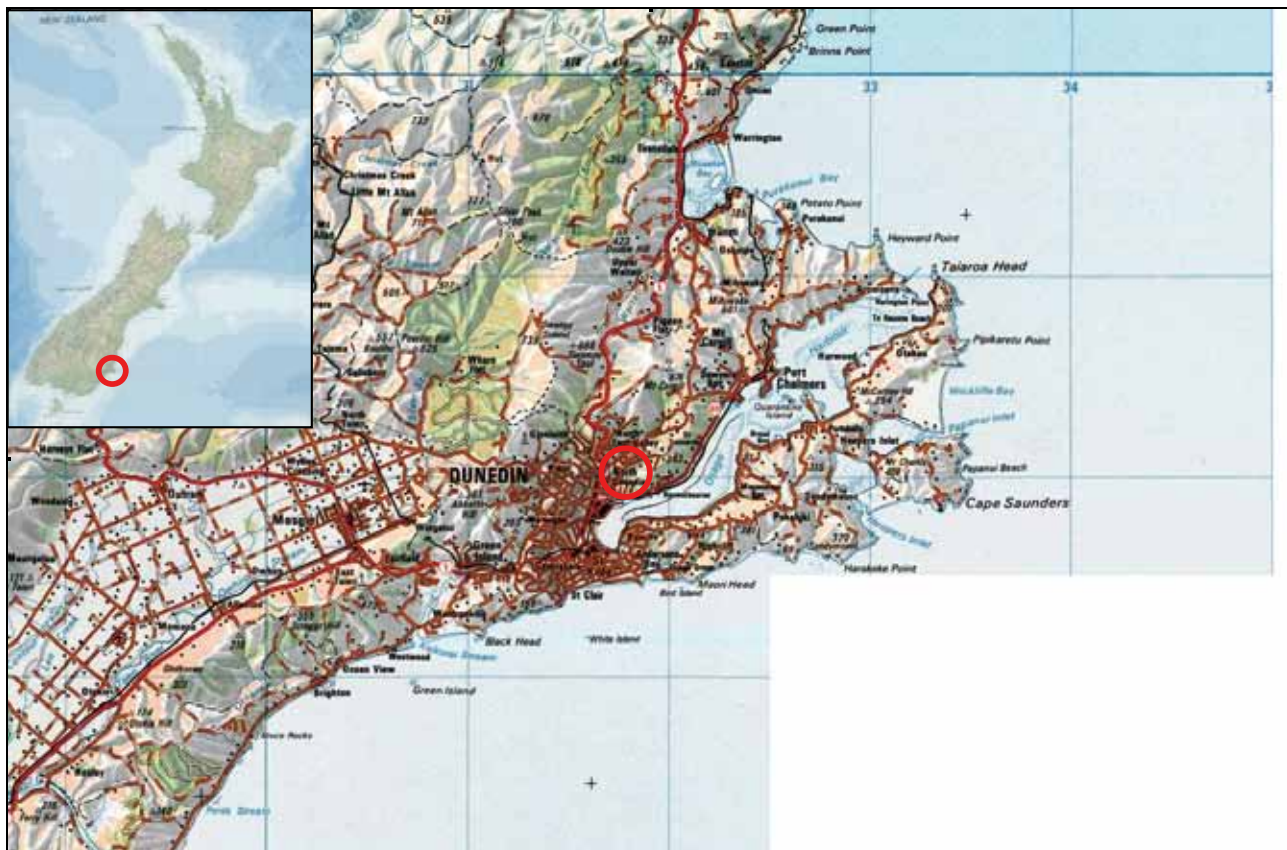


Figure 1. Location of the Otago Acclimatisation Society 1868 - 1885 Opoho Fish Ponds in Dunedin.

than could have been achieved by a small team of archaeologists, as used in the previous two investigations. As the full extent of the site is now known, better informed decisions can be made on where to place the fencing to protect the site and the interpretation panel, and how the public will access the ponds.

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Figure 2. Location of the Otago Acclimatisation Society 1868 - 1885 Opooho Fish Ponds in native bush, next to Opooho Creek, Dunedin (see Figure 3)

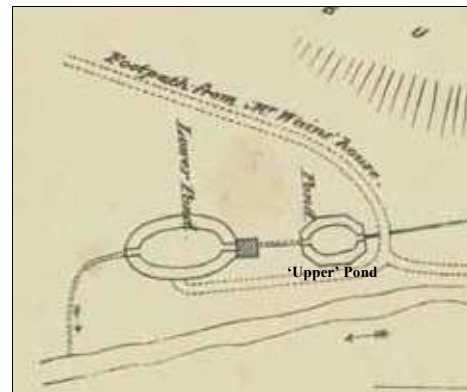
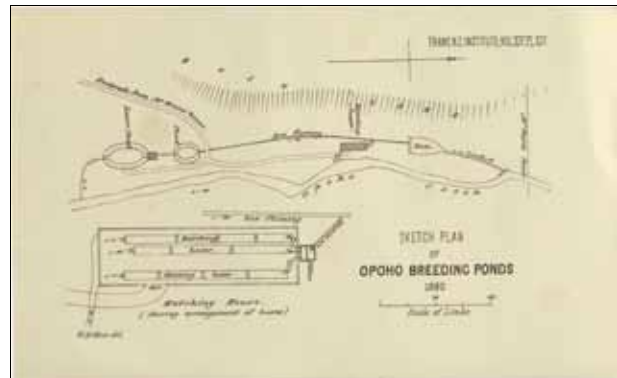


Figure 3. Top: Arthur's 1880 sketch map of the ponds. Bottom: Close view of the Lower Pond and the 'Upper' Pond further exposed during International Archaeology Day 18 October 2013 (Arthur 1881:208-209)



Figure 4. Volunteers from Fish and Game, Otago and archaeologist Phil Latham from the University of Otago (back right) (Photo: NZHPT)



Figure 5. Mountain Biking Otago volunteers and Niall Watson from Fish and Game (right) (Photo: NZHPT)



Figure 6. Junior archaeologists volunteering their time. From left: Jakob, Erica, Rebecca and Louis. (Photo: NZHPT)



Figure 7. The large Lower Pond before vegetation clearance and excavation (pictured: Niall Watson, Fish and Game Otago). (Photo: NZHPT)



Figure 8. The smaller Upper Pond before vegetation clearance and excavation (Photo: NZHPT)



Figure 9. Clearing vegetation from the Lower Pond (Photo: NZHPT)



Figure 10. Clearing vegetation from the Lower Pond (Photo: NZHPT)



Figure 11. Clearing vegetation from the path on the south side of the Lower Pond (Photo: NZHPT)



Figure 12. Clearing vegetation from the remains of the small stone hut at the top of the Lower Pond (Photo: NZHPT)



Figure 13. Hamish Seaton of Mountain Biking Otago cutting up a large tree which has fallen through the middle of the Upper Pond (Photo: NZHPT)



Figure 14. The Lower Pond after vegetation clearance and at the start of excavation (Photo: NZHPT)



Figure 15. The Upper Pond after vegetation clearance. The sun shines on the pond with the level terrace running around the outside. The stone outlet is visible in the foreground (Photo: NZHPT)



Figure 16. The Lower Pond hut after vegetation clearance by archaeologist Phil Latham (Photo: NZHPT)



Figure 17. The stone steps after vegetation clearance (Photo: NZHPT)



Figure 18. Excavation of the Lower Pond (Photo: NZHPT)



Figure 19. Excavation of the Lower Pond (Photo: NZHPT)



Figure 20. Excavation of the Lower Pond (Photo: NZHPT)



Figure 21. Excavation of the Lower Pond (Photo: NZHPT)



Figure 22. Excavation of the Lower Pond (Photo: NZHPT)



Figure 23. Completion of the excavation of the Lower Pond showing the stonework and access terrace (Photo: NZHPT)



Figure 24. The Lower Pond viewed from the stone hut ruin above the pond (Photo: NZHPT)



Figure 25. The Lower Pond on completion of excavation (Photo: NZHPT)



Figure 26. Excavation of the Upper Pond with 19th century Welsh roofing slate found in the fill (Photo: NZHPT)



Figure 27. Excavation of the Upper Pond (Photo: NZHPT)



Figure 28. The Uouer Pond after excavation. This pond requires more excavation work to complete its investigation and management (Photo: NZHPT)



Figure 29. The stonework of the Upper Pond showing its limit around its top edges and at its exit (Photo: NZHPT)



Figure 31. The stone hut ruin after excavation with the alcove on the right, outline of the remains of the walls and Lower Pond in the background (Photo: NZHPT)



Figure 32. Another view of the hut ruins showing the stone alcove in the background and the remains of the walls (Photo: NZHPT)



Figure 30. The stone huts ruins during excavation (Photo: NZHPT)



Figure 33. Stone steps leading down to Opoho Creek located near the southern eastern edge of the Lower Pond (Photo: NZHPT)



Restoration/Conservation/Rehabilitation Of North West Minaret Of Jahangir Tomb

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1. Location

The Jahangir tomb is situated on the right bank of River Ravi at Shahdara on the north-western outskirts of Lahore (31°-34' N & 74°-2' E), Punjab.

2. History

Emperor Jahangir the fourth king of the Mughal dynasty in subcontinent was born in 1569 A.D. After the death of his father Akbar the Great Jahangir ascended the throne in 1605 A.D. at the ripe age of thirty six years. After reign of 22 years, he died on 28th October, 1627 A.D. at Rajauri in Kashmir on his way back to Lahore. According to his last wish, he was buried at Lahore in a significant royal Garden known as "Dilkusha" owned by his favourite wife Noor Jehan.

3. Jahangir's Tomb

The Mausoleum over his grave was erected by his eldest son and successor Shahjahan (1627-58 A.D.). It took ten years (1627-1637 A.D.) to complete at the cost of Rupees ten lacs. The Mausoleum as it stands is surrounded by a luxuriant garden 1600x1600 ft. covering an area of about 58.77 acres. The entire area is further laid on the pattern of "Chahar Bagh" and is divided into sixteen sub-square grassy lawns by means of walkways and water channels in the middle. At each intersection there is an octagonal raised water tank provided with a marble fountain in the centre with cascades on either end. Plenty of ornamental shady trees were grown in the Garden. The mausoleum and the garden are enclosed by a high perimeter wall with an imposing gateway, which links the Akbari Sarai on the western side and baradaris on the remaining three sides.

4. Architecture

The tomb, a single storey structure, is square in plan with 267 feet sides and built in red sand stone richly inlaid with white marble decorative motifs. It stands in an immense garden of 58.77 acres, divided into sixteen sub quarters by means of walkways and water channels. The principal effect in the embellishment of the tomb is obtained through applied colour decorations in the form of richly decorated fresco paintings and mosaic tiles in addition to the delicate pietra dura and marble intarsia of various colours. The idea of white marble motifs incised in red sand stone such as ewer, fruit dish and rose water sprinkler appears to have been taken from Persian miniature paintings.

While the low height of the building appears to be an architectural shortcoming, the four handsome corner minarets crowned with white marble cupolas and rising up in five stages to a height of nearly 100 feet above ground, not only make good this drawback but also add to its magnificence and grace. These minarets are decorated with variegated marble in zigzag pattern and

are the fore-runners of the refined and octagonal minarets of the imperial Mughal style.

The marble cenotaph with the delicate and colourful pietra dura work engraved with the ninety-nine attributes of God, Emperor's name and the date of his death all in superb calligraphy, is also a fine example of workmanship in marble.

As recorded by Shahjahan's historian, Muhammad Salih Kamboh, in his work *Amal-e-Salih* there was another cenotaph occupying the centre of the raised platform on the spacious roof of the tomb. Structural evidence shows that, this platform was originally decorated with marble cenotaph and marble railing all around.

5. Present condition

Most of the original decorative features of Jahangir's mausoleum and other monuments at Shahdara have been plundered during the period of political anarchy that followed in the wake of the decline of the Mughal rule, especially when Punjab came under the domination of the Sikhs. Precious stones used in the decorative motifs were removed from the Mughal buildings by the Sikhs to embellish the Golden Temple at Amritsar. This treatment was meted out to most of the Mughal buildings in Lahore and Jahangir's mausoleum was no exception to this large scale vandalism by the Sikhs. The tomb of Jahangir was also used as a residence of one of the French officers of Sikh Army. Sultan Mahmood Khan, the brother of Dost Muhammad Khan the ruler of Afghanistan, whose army made fire places in the halls of the mausoleum, also contributed to its decay and deterioration.

Further, colossal damages were done to this complex of monuments at Shahdara due to the adverse effects of weather changes, temperature variations, periodical floods, earthquakes, direct impact of rains, strong winds and other natural hazards, all had contributed to its present condition, what we see today.



6. Causes of decay

- a) Natural causes having a prolonged action
 - i. Physical causes: Age, water, humidity, temperature, and wind.
 - ii. Chemical and electros
Chemical causes: Water and atmosphere.
 - iii. Botanical causes: The growth of autonomous plants in the immediate vicinity of the monument:
 - iv. Biological and microbiological causes wood worms, fungi, white ants & termites.
- b) Natural causes having an occasional action
Floods, water pours inundation and other disorderly water flow, fire and earthquakes.
- c) Causes depending upon human behaviors, additions and alteration in the original structure, bad conservation in an unplanned way, and encroachments near around the monument.
The decayed and washed out walkways of Jahangir's Tomb and Asif Khan's Tomb may be restored on its original layout and design.

7. Measures for preservation and restoration

There is a general awakening among community of nations that historical monuments, cultural relics, work of art and archaeological mounds belonging to particular country are the legacy of the entire humanity and must be guarded and preserved for the future generations. Each country has a moral duty and national obligation for the proper preservation of her cultural properties with a view to prolong their life and make them meaningful for the understanding of their functional aspects and artistic features.

Achieving this objective a Master Plan has been prepared for the preservation and restoration of decayed land missing components of the monuments along with washed out walkways of Jahangir's Tomb and Asif Khan's Tomb may be restored on its original layout and design

8. Objectives

The primary objectives of the Project is to preserve and restore the original components of the mausoleum i.e. Sang-e-Badal flooring platform, Red Sand Stone Façade, Perimeter Wall, Asif Khan's Tomb. Akbari Sarai, Walkways and Lawns etc.

The Mausoleum of Emperor Jahangir:

The tomb of Emperor Jahangir was constructed by Emperor Shah Jahan in the Bagh-e-Dil Khusha belonging to Noor Jahan Queen of Jahangir. It was the wish of Emperor Jahangir that, i) I must be buried in Bagh-e-Dil Khusha at Shahdara, Lahore. ii) my grave must be open to the sky.

The construction of the Tomb was commenced in 1627 A.D. and was completed in 1637 at a cost of Rs. 10,00000/- (Ten Lac) by the order of Shah Jahan, the successor and the son of Jahangir. In the history of the Mughal Architecture, it is 2nd important monument after the Taj Mahal at Agra.

There is no doubt that the construction of the Taj Mahal was initiated by the Shah Jahan from the Tomb of Emperor Jahangir. The layout of the garden is designed on the Persian idea of Chahar Bagh or four gardens. The Parapet ring along the boundary wall 1675 all-around having a built in reservoir to be filled up through Persian wheels working for the day and night at about twelve numbers of well existing in side & out side of the boundary wall.

Water from the reservoir is serving for the playing of fountains existing in the located Tank of each square of the garden. The filled up tanks supply the water to the channels & then lawns, through water cascade provided on all four sides of the main water tanks with the fountains in the center.

The unprecedented floods of 1843 A.D. played havoc with the enclosure wall of the monument along with the main structure of the tomb. A number of cracks were developed in the Arched Verandah & Four Corridors of the Mausoleum due to earthquake which also had damaged the top cupolas of the Badshahi Mosque, the Shish Mahal of the Lahore Fort and Chauburji Garden N.W. Minaret of the gateway. Even various floods in the second half of the 20th century i.e. 1955 & 1988 etc. also contributed in the devastation of this monument and the garden as well.

Tilting of the North West Minaret::

It was 1970 when news in daily news papers flashed out that the North West Minaret of Jahangir's tomb Shahdara is tilting towards outside.

The Department of Archaeology there & then approached the WAPDA authorities and a tilto meter was fixed on the Top Story of the minaret. The instrument remained there for a considerable period to observe any sign of tilting through this device. During this period no sign of tilting was observed.

It is odd that the base of the minaret had shown continuous development in its cracks and developed in fissures, bulged out considerably. Keeping in view the precarious condition of the minaret which was supposed to be the worst, it was decided to take up in hand the work of restoration of this minaret. But due to precarious condition of this minaret, the program was cancelled for one reason or the other. No doubt that the precarious condition of the bulged out base of this minaret had required a very careful treatment while taking in hand the restoration work. However, a bold step was taken in 1907-08 after adopting all the precautionary measures towards its proper support as per requirement of the site.

After a thorough study of the minaret being 100 feet high from ground level, it was decided that the work of restoration of this minaret may be taken in hand immediately before any untoward incident could take place. Since then, the restoration work of this minaret was commenced and it is a great satisfaction that the entire minaret had been completed in all respect by restoring all its original and new stone pieces fixed at its proper sides

according to the original layout and design.

First of all, the documentation of the entire structure (i.e. dilapidated condition of the base of this North West Minaret of the Mausoleum of Emperor Jahangir Shahdara) was done.

To ensure the stability of the upper structure proper and well designed scaffolding was raised to support the projected brackets and eaves of the upper stories of this Minaret accordingly.

The Detail of the works done at site is as below:

- 1 Documentation of the resultant portion of the North West Minaret before during and after completion of the restoration work.
- 2 Raising of tubular Scaffolding to support upper stories of the Minaret by giving proper support underneath the projected brackets and eave.
- 3 Dismantling of all bulged out portion of the octagon base one by one as per need and requirement.
- 4 Restoration of all original and new stone components at its original place duly fixed with the cooper dowel and clamps along with the stone dowel etc.
- 5 Date card on the resultant newly restored stone pieces have been affected accordingly.
- 6 Providing and laying PCC 1:2:4 as adhesive to create a bond between the core of the minaret and all old and new stone pieces fixed at their proper place.

The following works have been done according to the set principals of the conservation.

Item No. 1

Preparation and fixing in position the Red Sand Stone Mudakhil 19" wide with inlay of White Marble motifs in floral design as per original layout and design with old and new stone pieces

Item No. 2

Preparation and fixing in position the Red Sand Stone Double Ghalta with inlay of White Marble motifs in floral and geometrical pattern design as per original layout and design with old and new stone pieces

Item No. 3

Preparation and fixing in position the Red Sand Stone Sehra 6" wide with inlay of White, Yellow and Black Marble motifs in floral design as per original layout and design with old and new stone pieces

Item No. 4

Preparation and fixing in position the Red Sand Stone Gul-e-Nau with inlay of White Marble motifs in floral design as per original layout and design with old and new stone pieces

Item No. 5

Preparation and fixing in position the Red Sand Stone Dillah Facing with inlay of White Marble motifs in floral and geometrical design as per original layout and design

with old and new stone pieces

Item No. 6

Preparation and fixing in position the Red Sand Stone Dassa with petal design as per original layout and design with old and new stone pieces

Item No. 7

Preparation and fixing in position the Red Sand Stone Mini Dillah with inlay of White Marble motifs in floral and geometrical design as per original layout and design with old and new stone pieces

Item No. 8

Preparation and fixing in position the Red Sand Stone Nasik Garvi 8½" x 8" as per original layout and design with old and new stone pieces

Item No. 9

Preparation and fixing in position the Red Sand Stone Nasik Corner/Nook Shaft 11"x44" as per original layout and design with old and new stone pieces

Item No. 10

Preparation and fixing in position the Red Sand Stone Single Ghalta at base in floral design as per original layout and design with old and new stone pieces

Item No. 11

Preparation and fixing in position the Red Sand Stone Single Base Plate Under Base Ghalta to provide horizontal level to erect the base properly on the same

Item No. 12

Provision for Rubbing, Grinding and Polishing of the entire surface of the base of this North West Minaret Complete in all respect, along with dismantling and removal of the tubular scaffolding raised for the restoration purpose.



LOCATION PLAN OF JAHANGIR'S TOMB, LAHORE

Before Conservation



During Conservation Pictures



After Conservation Pictures



PRESERVATION AND RESTORATION OF SHAHDARA COMPLEX OF MONUMENTS, LAHORE



Traditional Method of Transportation

PRESERVATION AND RESTORATION OF SHAHDARA COMPLEX OF MONUMENTS, LAHORE



Traditional Method of Stone Carving

PRESERVATION AND RESTORATION OF SHAHDARA COMPLEX OF MONUMENTS, LAHORE



Traditional Method of Stone Cutting

PRESERVATION AND RESTORATION OF SHAHDARA COMPLEX OF MONUMENTS, LAHORE



Traditional Method of Cutting & Inlay of Marble Motives

PRESERVATION AND RESTORATION OF SHAHDARA COMPLEX OF MONUMENTS, LAHORE



Traditional Method of Tools Preparation

PRESERVATION AND RESTORATION OF SHAHDARA COMPLEX OF MONUMENTS, LAHORE



Traditional Method of Conservation

PRESERVATION AND RESTORATION OF SHAHDARA COMPLEX OF MONUMENTS, LAHORE



Traditional Method of Stone Leveling



Protecting our Cultural Heritage: A Herculean Task

Louella Solmerano Revilla, *Administrative Assistant*
San Agustin Museum, Manila

Whenever I set foot on a World Heritage or any significant cultural site, the experience has the usual overwhelming impact on me. I was still pondering on the recent unique tour experience I had had at the Puerto Princesa Subterranean River National Park, a protected natural resource in Palawan, Philippines, when terrible news came out the very next day I returned to Manila. A 7.2 magnitude earthquake hit the Visayan Region on October 15, 2013 leaving people grieving over lives lost, homeless, devastated, and important cultural properties in ruins. I was aghast to see pictures of damaged centuries-old churches aired on television and posted on social media sites. The churches, watchtowers, bell towers, and government buildings were not spared in Bohol and Cebu. Included among the damages is the bell tower of an old Augustinian Church, the Basilica del Santo Niño de Cebu, the area where the revered Sto. Niño of Cebu is housed. How can such magnificent structures that withstood the test of time be literally reduced to dust and rubbles in one instance? These were not just ordinary buildings, but most were places of worships that existed when Catholicism was introduced in the country and embraced by the Filipinos. The churches were uniquely built by Filipinos and foreign workers. These are places where people gather, where little children are taught in Catechisms, where families come together to pray, where communities are built. It is part and parcel of our culture, our way of life.

The country's cultural agencies, namely the National Commission for Culture and the Arts (NCCA), the National Museum, the National Historical Commission of the Philippines, spearheaded, in a special emergency meeting, a plan for the rapid assessment of the destroyed heritage structures declared as "National Cultural Treasures", "Important Cultural Properties" (ICPs), and "National Historical Landmarks" (NHLs), including the undeclared heritage structures with historical and cultural value. The plans were made in the presence of representatives of the National Archives, the Diocese of Tagbilaran, ICOMOS representatives, Local Government units, and Department of Public Works and Highways, National Disaster Risk Reduction, and Management Council, the Armed Forces of the Philippines, and some volunteers.

Tacloban and its nearby areas, the sites which bore the wrath of the recent super Typhoon Yolanda (Haiyan) last November 8, 2013, suffered already a history of storms with inevitable casualties and destruction. History repeats itself. The Philippines experienced one tragedy after another, something unimaginable to happen in a year that caught global attention. The effect of super Typhoon Yolanda based on the latest detailed report as of the 13th of December 2013 by the Philippines' National Disaster Risk Reduction and Management Council (NDRRMC),

around 6,009 individuals were reported dead, 27,022 injured, and 1,779 are still missing. Many houses were damaged and families were displaced. A specific historic 18th century church of the Immaculate Conception in Guiuan, Samar province, was affected like most structures in the town of Eastern Samar. A National Cultural Treasure, again, laid in ruins after the earthquake in Bohol and Cebu.

I recall now what Dr. Javier Galván Guijo, a Spanish Architect whose expertise is on Fil-Hispanic Architecture, what he mentioned about a paper he wrote years back when he was assigned in the Philippines, about why mother nature is not only to be blamed. He was a consultant then in the 1990s in an International funded project to produce master plans of Baguio and Dagupan. He said that one of the main goals of the master plan was to identify the hazardous zones regarding earthquakes, typhoons, flooding, and landslides. There was a zoning showing areas where construction should be avoided. Since nothing out of the plan he equipped was implemented before many lives perished during a typhoon Fera that hit Baguio in 2001.

In this note, one may come to think about the heritage churches and sites in Cebu, Bohol, Tacloban, or Guiuan. Were there previous preventive measures or emergency preparedness plans laid out for these declared "National Cultural Treasures", "Important Cultural Properties" (ICPs), and "National Historical Landmarks" (NHLs)? Could we have lessened the impact of natural calamities on these cultural properties if previous assessments were made and the stability of each structure prioritized? These are just some of the questions which some of us would have in mind. I wanted to hear personally from those who are involved in the recovery program and so I asked if we are prepared to face another calamity. In general, a master plan with a much detailed report and survey will be produced for future reference for each of the cultural sites. There will be a rehabilitation program of the affected areas. Expected output ranges from broad spectrum considering the extreme climate change. From here, you will come to realize the value of documentation which the Augustinians, other religious congregations, and historians, and simple art enthusiasts have done through the years.

What happened already serve as an eye opener for all of us. There is a big responsibility that all of us as custodians of our cultural heritage must recognize and fulfill. I do believe in the hope, faith, and perseverance of the Filipino people. It may have been a disheartening sight when you see your countrymen suffering. I can say that it is also heartwarming to witness the overflowing relief support we get from all parts of the world. We all have seen this global affirmation.



1a) Baclayon Church, Bohol



1b) Aftermath photo

Baclayon Church

Declarations: NHL (1994) / NCT (2010)

1a) Parish was founded in 1717. Main church structure was erected in 1727 and the portico-façade in 1875. Its bell tower serves as a watch tower. (Photo by Dr. Javier Galván Guijo)

1b) October 2013. Extensive damage. The Portico-façade was completely destroyed. The bell tower collapsed, with half the base standing un-faced with coral stone facing; exposing the lime and mortar section of the wall. (Photo courtesy of NHCP)



2a) Loboc Church, Bohol



2b) Aftermath photo

Loboc Church (Iglesia Católica San Pedro Apostol)

Declarations: NHL(1998) / NCT(2001)

2a) The church complex is composed of plazas, a convento, and a belltower. Parish was founded in 1697. Church structure was erected in 1734, while the façade between 1863-866. (Photo by Dr. Javier Galván Guijo)

2b) Large-scale damage. The recent Recollect-built façade and the Jesuit-built in the 18th century completely collapsed, with the old bell tower as part of the Jesuit-built façade, remain standing. (Photo courtesy of NHCP)

2c) A rare scenic photo of Loboc Church by the river before the earthquake (Photo by Dr. Javier Galván Guijo)



2c) Before the earthquake



3a) Loay Church, Bohol



3b)Loay watch tower



3c) Aftermath photo

Loay Church, Bohol (Iglesia Católica del Santísima Trinidad)

Declarations: NHL (2003)/NCT (2013)

3a) The church before the earthquake. Parish was founded in 1799 and church structure erected in 1822. (3b) Loay watch tower before the earthquake (Photo by Dr. Javier Galván Guijo)

3c)Extensive damage on the portico, exposing the original façade; ruptures at the both sides of the transept. (3a & 3c photos courtesy of NHCP)



4a) Dauis Church, Bohol



4b) Aftermath photo

Dauis Church, Bohol (Iglesia Católica del Nuestra Señora de la Asuncion Complex)

Declarations: NHL (2009) / NCT 2011

4a) Parish was founded in 1697 while the structure erected in 1863, developed in 1884, and consecrated in 1923.

4b) Extensive damage after the earthquake (4a & 4b photos courtesy of NHCP)



5a) Punta Cruz Watch Tower, Maribojoc, Bohol



5b) Aftermath photo

Maribojoc, Bohol (Punta Cruz Watch Tower)

Declarations: NHL (2009) / NCT (2012)

5a) Before photo / 5b) Moderate to serious damage. No specific inspection yet due to inaccessibility

(5a & 5b photos courtesy of NHCP)



6a) Maribojoc Church, Bohol



6b) Aftermath photo

Maribojoc Church, Bohol (Iglesia Católica del Sta. Cruz)
 Declarations: NCT (2010) / NHL (2010)
 6a) The church was founded in 1697, the structure erected in 1852.
 6b) In total ruin. Condition: buried.
 (6a & 6b photos courtesy of NHCP)



7a) Loon Church, Bohol



7b) Aftermath photo

Loon Church, Bohol
 Declarations: NCT (2010) / NHL (2010)
 7a) The Parish was founded in 1753, the church structure erected in 1855, and inaugurated 1864.
 7b) In total ruin. Condition: buried.
 (7a & 7b photos courtesy of NHCP)



8a) Panglao Watchtower, Bohol



8b) Aftermath photo

Watchtower. Panglao, Bohol
 Declarations: NCT (2011)
 8a) Before Photo
 8b) Moderate to serious damage
 (8a & 8b photos courtesy of NHCP)



9a) Cortes Church, Bohol



9b) Aftermath photo

Iglesia Católica del Sto. Niño, Cortes, Bohol
 Declaration: NCT (2013)
 9a) Structure was erected in 1892
 9b) Extensive damage
 (9a & 9b photos courtesy of NHCP)



10a) Balilihan Belltower, Bohol



10b) Aftermath photo

Balilihan Belltower, Bohol
 Declaration: NCT (2011)
 10a) Recognized also as Watchtower
 10b) In total ruin. The Belltower was completely destroyed.
 (10a & 10b photos courtesy of NHCP)



11a) Albuquerque Church, Bohol



11b) Aftermath photo

Iglesia Católica de Sta. Monica, Albuquerque, Bohol
 Declarations: ICP (2013)
 11a) The Parish was founded in 1869 and the structure erected in 1885
 11b) Damages on the façade and interior of the convent
 (11a & 11b photos courtesy of NHCP)



12a) Iglesia Católica del San Agustin Complex, Panglao, Bohol



12b) Aftermath photo

Iglesia Católica del San Agustin Complex, Panglao, Bohol
 Declaration: ICP (2011)
 12a) Photo before the earthquake
 12b) Minimal damage
 (12a & 12b photos courtesy of NHCP)



13a) Dimiao Church, Bohol



13b) Aftermath photo



13c) Aftermath photo

Dimiao Church, Bohol
 Declaration: NCT (2011)
 13a) The church was erected in 1800 and finished in 1815 (Photo by Dr. Javier Galván Guijo)
 13b) Peeled portion of the right belfry
 13c) Damaged rear pediment
 (Photo by Archt. Daryl de Leon of NHCP)



14a) Bohol Provincial Capitol (Government Important Cultural Property)



14b) Aftermath photo

Bohol Capitol, Tagbilaran City, Bohol
 14a) Structure was erected in 1911
 14b) Damaged portion of the Capitol's Façade
 (14a & 14b photos by Archt Benjamin Concepcion Empleo)

EFFECT OF THE SUPER TYPHOON YOLANDA



15a) La Purisima Concepción Church, Eastern Samar

La Purisima Concepción Church, Eastern Samar
 ICT
 15a) 18th Century Jesuit Church
 This photo was taken after the Super Typhoon Yolanda showing the remnants of the façade of the church. (Photo by Ross Cuña)

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Conservation of Tampita Vihara (Temple on Pillars), Dambadeniya

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Introduction

This proposal outlined the present situation of important heritage building in North Central Province in Sri Lanka and preventive measures followed for conservation on a brief examination.

The Tampita Vihara or Temple on Pillars is image houses that are constructed on stone pillars. By the medieval era, this kind of smaller image houses were constructed using wattle and daub or clay walls. The inner chamber rests on large cross sectional timber beams placing across stone pillars to avoid the harm done by insects and water/damp as the civilization shifted to wet zone. The main raw material used here was wood.

Some kind of Tampita Vihara

Wooden Technology

The ancient technology of wood was in a peak position. The most basic and important wooden component in an ancient building was the wooden pillar. The rafters were carved at ends (gonas) and a stick identified as "Iddha" was used to avoid displacement. The joint which was used to extend the wall plate was called lengthening joint.

During early times of Sri Lanka, buildings were constructed with clay and wattle. Wood was eminent in constructing buildings in Sri Lanka by the 7th-8th century A.D., and later, wooden constructions were transformed in to stone constructions. Even after this, wood was used for the roof in most buildings. The left over wooden structures and remnants belong to the medieval era.

The pillar head is the most significant wooden part in buildings of the medieval age. Huge wooden arches

were used horizontally over these to help and bear the weight. The pillar head helped to lengthen the eave.

The strength and the impressive appearance were given prominence in the old buildings. Mee (*Madhuca longifolia*), Na (*Mesua ferrea*), Gammalu (*Pterocarpus marsapium*), and Palu (*Manickara hexandra*) were the wood used.

Hundreds of Tampita Vihara existed in North Western, Sabaragamuwa and Central Provinces. Most of these cultural properties have been neglected or abandoned due to various reasons. Archaeological authorities are unable to interfere in their renovations due to insufficient financial allocations.

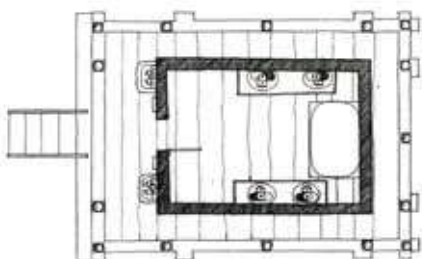
The conservation strategy of this type of timber buildings are drastically differentiated from a normal situation as these buildings contained vulnerable materials except stones. When making the management plan for these projects, special attention about this aspect should be drawn.

Most of the timber heritage buildings in this type were deteriorated and destroyed in following ways.

- i. Negligence
- ii. Poor maintenance due to financial problem of occupants or caretakers
- iii. Looting
- iv. Termite Attacks

When preparing a Conservation plan, lots of constraints have been faced i.e.

- i. Lack of funds



- ii. Lack of skilled manpower
- iii. Finding quality timber components
- iv. High cost of building materials-Timber

There are hundreds of timber heritage buildings of abandon situation. Wooden buildings in ancient period, temples and forts etc. are rich in its architectural, cultural, spiritual and other values among them.

Conservation and restoration strategy is needed to be strengthened for the protection of heritage and contribution to sustainable development in these areas to assist the state authorities.

The main goal of protection strategy includes;

- i. Condition Assessment
- ii. Comprehensive documentation
- iii. Conservation proposals
- iv. Costing for Conservation
- v. Financial allocations (from government, sponsors, NGO's etc.)
- vi. Restoration plan followed by proper maintenance program

The conservation, restoration and maintenance proposal suggests a method to protect Dambadeniya Tampita Vihara from further deterioration. It is also supposed to save important historic building type in the heart of the North Western Province.

Background information

Dambadeniya

Dambadeniya is located in North Western province of Sri Lanka and about 65 km away from Capital City, Colombo. The Dambadeniya Tampita Vihara is situated 250m away from the town.

History

Dambadeniya is one of the Sri Lanka's ancient capitals in the mid-13th century. The King Vijayabahu the III (1220-1236 AD) established the Kingdom of Dambadeniya. The temple had been built by king Vijayabahu the III and the King Parakramabahu II (1236-1271) had kept the Sacred Tooth Relic here.

Four kings ruled from here. They were,

1. Vijayabahu III (1220AD-1236AD)

2. Parakramabahu II (1236AD-1270AD)
3. Vijayabahu IV (1270-1272AD)
4. Bhuvanekabahu I (1272AD-1283AD)

The first king to choose Dambadeniya as his capital was Vijayabahu III. He was able to bring about the unity among the Sangha (Monk) that had fled in various directions due to the hostile activities of the invader Kalinga Magha and succeeded in holding a Buddhist convention in 1226 to bring about peace among the Buddhist clergy.

King Parakramabahu II was the king who inherited the throne after King Vijayabahu. He was considered a genius, who was a great poet and a prolific writer. Among the books he wrote are Kausilumina (Poetry), which is considered a great piece of literature. Unifying the three kingdoms that existed within Sri Lanka at that point of time is regarded as greatest achievement.

King Bosath Vijayabahu, as the eldest son of King Parakramabahu the second was crowned in 1270. He was well known for his modest behavior and for his religious activities. He was killed in the second year of his reign by a minister called Miththa. After the demise of his elder brother Vijayabahu, Bhuvanekabahu I, as the next in line to the throne, shifted the capital to Yapahuwa for reasons of security. He followed his father's footsteps as a writer and continued with the religious activities started by his brother Vijayabahu IV.

Excavations have uncovered remains of the temple of the Relic of the tooth of the Buddha and the Royal Palace, ponds and garden layouts, moats, and city walls. The two storey temple of the Tooth Relic has Buddha images, and is identified as the Vijayasundaramaya. It has some interesting wall paintings dating from the 18th century, when it was restored.

Analysis of present condition

This Tampita Vihara building is one of the most significant historical monuments in this area and depicting a most important and aesthetic and architectural features.

Its most prominent feature is that, it is mounted on monolithic pillars with top Pekada.

This Viharaya (Image House) that stood on raised platforms of smooth stone and stone pillars was constructed this way in order to prevent termites or other



insects from entering it and damaging it.

These archaic monuments are preserved by the Department of Archaeology. The superstructure of the building is composed of clay walls in ground floor and wattle and daub in upper floor is square in shape.

Such Viharaya (Image House) enshrines Buddha statues and are places of worship. The walls and ceilings are adorned with murals and the roof is thatched with flat tiles on timber frame work. There is a drumming hall very close to the Tam-pita Vihara which are joining with roof.

Foundations

The foundation consists of well finished stone work with mortar. Even though excavation has not been conducted, the foundations below the ground level are not identified. But it is in satisfactory condition.

Walls

The clay and wattle and daub have been used to construct walls. Every wall has been plastered using lime mortar and murals on it. Normally the thickness of walls and plaster has considerably high.

The condition of structural stability of most of walls is in bad situation due to the deterioration of timber frame on ground floor ceiling level.

Floor, wooden upper floor

There are various types of finishing materials using floors. i.e. rendering cement in verandah and upper floor, ceramic tiling in inner shrine area of ground floor and terracotta tiles on drumming hall. The ceramic tiles in ground floor are damaged due to detachment from floor. The upper floor which was made of wood is covered with smooth cement mortar layer in a latter period.

Openings

Two doors in ground and upper floor are in satisfactory condition.

Roof

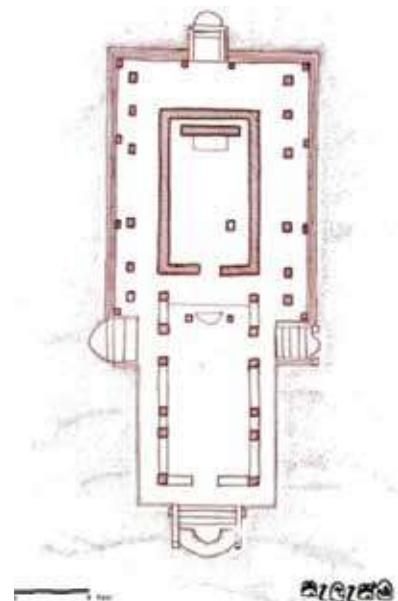
Both roof of drumming hall and Tampita Vihara are almost good in condition except some decayed rafters. Once removing the roof for conservation purpose, reepers, tiles and some rafters will have to be replaced.

Values of the Dambadeniya Tampita Vihara

Although this building had been abandoned for past decades it has many values. They can be summarized as follows.

Historic value

This building was included in main administration centre of 13th century A.D. in Sri Lanka. The King Vijayabahu



III (1220AD-1236AD) and the King Parakramabahu II (1236AD-1270AD) played vital roles of Sri Lanka's history. Therefore it is a historical testimony for future world.

Architectural value

This building represents the Sri Lanka's most important building tradition named Tampita Vihara. Carved wooden components, Decorative murals, timber roof frame and statues are its characteristics.

Economic value

The temple is situated in a high land value area of the Dambadeniya town close to the Dambadeniya ancient kingdom (Maliga Gala). It will be a good income generating attraction if a proper tourism plan has implemented.

Material value

All the walls of this building have been made out of mud/clay and wattle and daub which are in original state. In Sri Lanka, wattle and daub technology is used widely in ancient period.

Artistic value

Although the two buildings are vary in the construction method and solid void ratio, the artistic impression is high as the architectural composition is excellent. Inner area of Shrine room in ground floor has been laid ceramic tiles in colonial era. Inner and outer walls and ceiling contained decorative and colorful murals.

Religious and Symbolic value

It has a religious and symbolic value as for a certain period of time, the sacred tooth relic of Lord Buddha had been housed. This monument is still worshiped by devotees.

Damage Typologies and Assessment

Knowledge in various types of damages will be helpful to understanding of the condition and damage assessment

of the individual elements of this building. Main damage in this monument is structural instability due to the decay of timber frame on ground floor wall.

However, following damages can be inspected.

i. Decay of timber frame on Ground Floor walls

3 Nos. of timber frames were placed on clay walls in ground floor. The upper floor wattle and daub walls are rested on this set of beams. It is visible that this set of beams, which contained murals in inner surfaces are totally decayed in most of the places. Surrounding crust of timber is remained and inner portion of timber deteriorated.

ii. Defects in painting

Fissures, cracks and discoloration are existed in painting layers. Termite and insect attack occurred.

iii. Water leaking from valley gutter

The Aluminum sheet valley gutter was placed on reepers in between two roof of drumming hall and lower roof of Tampita Vihara. Rain water will not drain well because of the insufficient sloping angle.

iv. Improper Electrical Installation

Electrical Installation is not in a safe manner.

v. Floor in Inner Chamber, Ground Floor

6"x6" ceramic tiles were laid on floor in inner chamber as later intervention. Because of heavy pilgrim density the tiles have been damaged and bulged.

vi. Haphazard constructions

Within this premises it is seen that the construction of various new building structures has been taken place which are very close to this monument. The environmental value of this building has been disappeared due to this situation. A multi storey



building is being constructed for the use of pilgrims. Now the basement has been completed and is being concreting for upper floor levels.

In the other side many advertisement signage from various sponsors appearing within the premises have damaged the environmental existence and visual impact.

Condition assessment of building elements

Building elements		Material / finishes / observations	Assessment	Proposed Intervention
Foundation	Drumming Hall	Rough finished stones and cement mortar joints	Uneven mortar joints	Removing existing cement grooves and reapply proper way
	Tampita Vihara	Smooth finished stones	Proper condition	No intervention
	Stair ways	Stone	Displacements	Rearrangement of stairway
Floor	Drumming Hall	Terracotta tiles laid on floor	Proper condition	No Intervention
	Plinth (Drumming Hall)	Cement rendering	Cracks	No major intervention. Only small repair works
	Tampita Vihara (Ground Floor)	6"x6" Ceramic tiles with some printed tiles	Displacement / bulging	Remove existing ceramic tiles and replacing suitable tiles
	Plinth (Tampita Vihara (Ground Floor))	Cement rendering	Cracks	No major intervention. Only small repair works
	Tampita Vihara (Upper Floor)	Cement rendering on Timber floor	Weight of this cement plaster will effect the load bearing capacity of upper floor level timber beams	To reduce the weight on timber frame, it is recommended to remove cement plaster and fixed timber planks
	Plinth (Tampita Vihara (Upper Floor))	Cement rendering on Timber floor	Weight of this cement plaster will effect the load bearing capacity of upper floor level timber beams	To reduce the weight on timber frame, it is recommended to remove cement plaster and fixed timber planks
Walls	Drumming Hall	3'-9" height, 12" thick walls around the drumming hall with top thick cement layer	Detached cement layer	Rectifying small cracks and white washing. Removing the top cement layer and fix timber plank.
	Tampita Vihara (Ground Floor)	Clay walls / Wall paintings on inner and outer surfaces / Another layer of wall painting under the existing painting in outer surface	Discolour finishes	Filling cracks and plastering if necessary and white washing / Removing the later intervention / Conservation of wall paintings
	Tampita Vihara (Upper Floor)	Wattle and daub walls / Wall paintings on inner and outer surfaces	Discolour finishes	Filling cracks and plastering if necessary and white washing / Conservation of wall paintings

Columns	Drumming Hall	Pekada on stone columns		Cleaning the stone columns using brush
	Tampita Vihara (Ground Floor)	Pekada on stone columns		Cleaning the stone columns using brush
	Tampita Vihara (Ground Floor)	Timber columns in outer row	Cracks	Cracks filled with suitable filling material. Removing the paint layer. Applying colourless wood preservatives.
	Tampita Vihara (Upper Floor)	Timber columns in outer row with railings in between them		Cleaning the timber columns and railing and applying colourless wood preservatives.
Timber Frame on ground floor walls	Tampita Vihara (Ground Floor)	3 Timber frames on clay walls. Paintings are existed on inner side of beams	Decayed timber beams / Seriously damaged timber parts	Replacing timber beams / or filling cavities with suitable strengthening materials. Consultation of professionals for further intervention.
	Tampita Vihara (Upper Floor)	Timber frames on wattle and daub walls. Paintings are existed on inner side of beams	Decayed timber beams / Seriously damaged timber parts	Replacing / Filling cavities
Ceiling	Tampita Vihara (Ground Floor)	Timber planks - underside of upper floor / Paintings	Spaces between planks	Filling cavities as suitable manner
	Tampita Vihara (Upper Floor)	Timber planks - Paintings	Spaces between planks	Filling cavities as suitable manner
Roof	Drumming Hall	Timber rafters are carved and Kandyan tiles on timber frame work	Decayed Rafters	Replacing decayed timber parts
	Tampita Vihara (Verandah roof)	Kandyan tiles on timber frame work		No intervention
	Tampita Vihara (Main roof)	Kandyan tiles on timber frame work		No intervention
Stair Case	Tampita Vihara	Timber	cracks	No intervention
Doors	Tampita Vihara	Timber Doors	Good	No intervention
Valley Gutter	Between roof of Drumming Hall and Tampita Vihara	Aluminum sheet placed on reepers in between two roofs	Rain water not drain well	Fixing Zn/Al sheet on timber plank bed
Electrical Installation		Already installed	irregular	Introduce proper electrical Installation system
Stair Case	Tampita Vihara	Timber	cracks	No intervention
Doors	Tampita Vihara	Timber Doors		
	Good	No intervention		
Valley Gutter	Between roof of Drumming Hall and Tampita Vihara	Aluminum sheet placed on reepers in between two roofs	Rain water not drain well	Fixing Zn/Al sheet on timber plank bed
Electrical Installation		Already installed	irregular	Introduce proper electrical Installation system

Interventions on the building and premises during the time

- i. Cement floor has been introduced on upper floor timber planks.
- ii. Ceramic tiles have been laid on inner chamber.
- iii. In later period the stair case has been shifted to outside verandah from inner chamber.

Proposals of the Conservation and Maintenance Plan

The conservation procedure includes further resistant of the deterioration of this heritage building and give life to several years. Therefore proper conservation program should be carefully designed and introduced. As the first intervention, beam set on ground floor walls to be strengthened. Therefore emergency shoring and props should be introduced to strengthen the walls till conservation finishes. The cracks and fissures should be sealed with cement mortar.

Conservation Process

Foundation

Although there are no structural failures visible, the joints should be filled with cement mortar.

Walls

Filling cracks and re plastering of damage portions followed by white washing is recommended.

Floor

Damaged floor tiles are to be replaced with suitable ceramic tiles for heavy usage. In any ways, cement concrete is to be used as a base.

Timber floor

Wooden floor has to be exposed in upper floor. Although new timber layer have to introduced for protection of existing planks.

Roof

Roof structure is seen to be well in condition. But following the conservation procedure for timber frame set, roof should have to be removed for reducing the weight. Therefore new timbers will be used when re erecting. Fixing Zn/Al sheet valley gutter on timber plank bed in correct sloping angle is recommended.

Timber Frame set

It is a great risk for replacing a 3 Nos. of timber frame set placed on ground floor walls. If there is any possibility to strengthen the decayed beams by filling cavities, it will deduct the 50% of conservation process.

In this process it is recommended to consult the professionals for further instructions in Engineering, timber and mural painting conservation fields.

Chemical Conservation for paintings and murals and anti termite solution

Chemical treatment and stabilization of paintings is recommended. Anti termite solution has to be applied.

Maintenance program

Maintenance work will help to the long life to the historical building. The proper maintenance program will be designed for preventive conservation. It is proposed that a suitable maintenance staff will be employed in certain occurrence with guidance by the qualified conservation/civil/building engineering personnel.

The regular inspections have observing all the critical points of this monument. The table below shows the procedures and occurrence in order to maintain the heritage building in proper manner.

Task	Occurrence
Inspection of the monument	Every month
Examination of floor	Every two month
Examination of Walls	Every two months
Examination of Roof and structural timber components	Every 6 months
Examination of termites and insect attacks	Every month
Maintenance of surfaces (painting etc)	Every months

Conclusion and Recommendation

Finding financial resource is the major difficulty to proceed with the conservation process as the Department of Archaeology is unable to finance to this project. In this situation there is a need to find a prospective donor to develop this project.

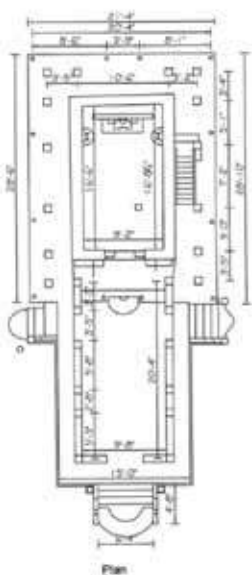
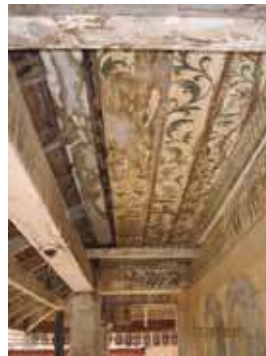
This proposal helps to conserve and maintain heritage buildings as well as improving its life in years to come. This is not only about the life style of the community in the area to be enhanced due to the sustainable tourism development. The proposal also assists to teach the values of the site and its cultural integrity.

Finally the budget is slightly high, according to the highly responsible situation of this monument and finding of suitable materials. Anyhow if it will be able to overcome the issues, the vast benefits will be gained to the people of Dambadeniya and also the Sri Lankan architectural conservation process.

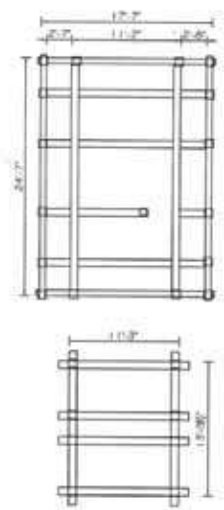
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- v. http://en.wikipedia.org/wiki/Kingdom_of_Dambadeniya

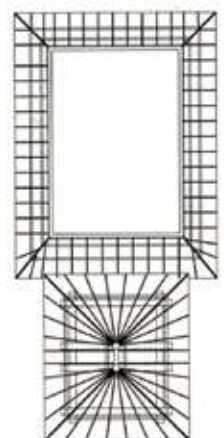
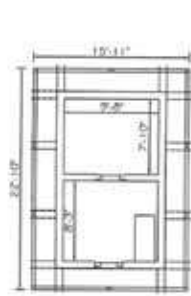
(This Tampita Vihara was conserved by the Department of Archaeology in 2013 with the financial support of a donor.)



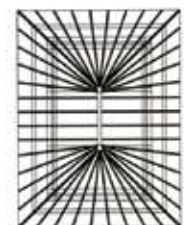
Plan



Beams Layout



Roof Plan





Building Complexes at Ancient Agricultural Settlements of Sarazm in IV-III Millennium B.C.E.

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Keywords: Archaeology of Central Asia, Chalcolithic and early Bronze Age, the unique ancient agricultural centre, cultural contacts between Southern Turkmenistan, Iran, Baluchistan and India, building complexes, architecture, stratigraphy, a monumental complex, local tradition of fellowship, UNESCO

Project Summary

The project addresses to a research of the development of the building industry and the evolution of building complexes in Sarazm settlements, ancient cultures to the second half of IV-III millennium B.C. E., which developed in favourable natural and geographical conditions of the valley of Zarafshan.

Given a detailed description of all building structures known in the settlement Sarazm, based on a comparison of data ceramic assemblages and results of radiocarbon analysis, the ratio of building complexes from all excavations over the horizon -Sarazm I, II, III and IV.

On the basis of comparison with synchronous monuments Southern Turkmenistan, Iran, Baluchistan identified as common to these monuments and characteristic features only for Sarazma construction.

I. Description of project

I.1. Scientific problem addressed by the project: This is the process of forming and development of building business in ancient agricultural settlements, Sarazm.

I.2. Relevance of the project: Study of the Neolithic building complexes -paleometal Central Asia is a key to understanding the processes of development and construction business architecture of the rudiments of the ancient inhabitants of this extensive region (Zarafshan Valley).

I.3. Project Goals and Objectives: The main objective of the project is the allocation factors and stages of development of building business at Sarazm settlements in the Eneolithic and Bronze Ages, based on the analysis of features.

I.4. Characteristics of objects/materials, which is made on the basis of the project: The subject of the study is the building complexes which were researched in the 12 excavations in Sarazm for the last 35 years.

I.5. Proposed approaches and methods of working with objects/materials: Methodology is based on an integrated approach to the study of material culture. Working with archives, stratigraphic and typological methods allowed to explore the features of the building industry and the stages of its development in Sarazm. Comparative-historical method was used to determine the general and

specific characteristics of construction affairs of Sarazm which were compared with synchronous monuments of Central Asia and the Middle East.

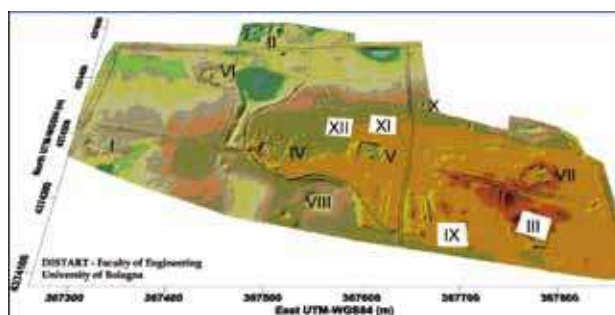
II. Contents of the project

Each building complex contains detailed characteristics of the structure and its main features: stratigraphic plans and provisions of circuit layout, shape and size of individual rooms, retaining walls and structures, systems of passages to the internal components. In a special section of the paper based on the analysis of ceramics, radiocarbon dates and stratigraphy data and building horizons of sites were investigated in the framework of the relative populations of periodization. Also, considerations for the construction technology were followings: aims and methods used for building materials (loess, stone, wood, mineral paints), methods of construction of buildings (application pakhsa, raw system and masonry walls) and their design features (fund, floors, pilasters, buttresses, etc.), as well as a system of passages and interior details (niches, windows, hearths, colouring and painting the walls). As a result, categories and types of premises and production facilities of Sarazm were defined. Based on the size, design features, layout and structure of the interior parts were highlighted in three main groups of construction in the complexes, within which there were several types and various plan of the buildings, as well as considered functional differences of these complexes.

A comparative analysis of structures under considered monument with buildings synchronous settlements Southern Turkmenistan, South of Afghanistan and Iran are identified as common to these as local features of construction and building industry specific only for Sarazm. The study showed that in the development of building business, Sarazma outlines two or even three stages, due to advances in construction technology, interaction population of Sarazm with different groups of the population from Central Asia and the Middle East, also natural conditions, and probably social factors.

III. Expected results of the project

Included that the first comprehensive analysis of the construction business Eneolithic and Bronze conducted



1. Map of Sarazm

on the basis of archaeological materials was derived from years (1977-2011 gg.) excavation of large agricultural settlements Sarazm, which since 2002 has been involved and the author. The results can be used in writing the generalized papers on archaeology and early history of Central Asia, as well as lecture courses on the history of ancient societies. In addition, the results of the study should be used for conservation and restoration work at the settlement of Sarazm.

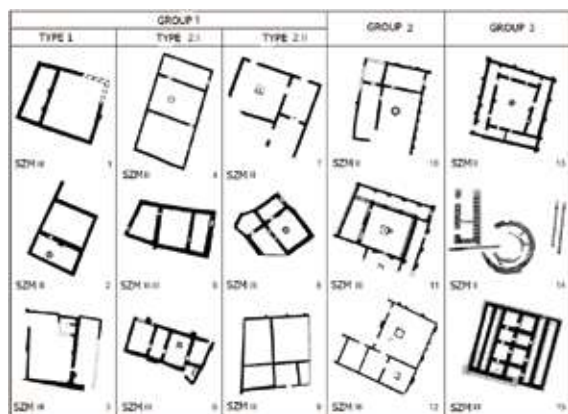
III.1. Current state of research on this issue in the world of science, innovation formulation of the problem in the project, comparison of expected results with the world level

Study of building complexes in Neolithic-paleometal Central Asia is a key to understanding the processes of development and construction business architecture of the rudiments of the ancient inhabitants of this vast region.

Before the discovery of the settlement Sarazm in the archaeological science dominated the opinion that in IV-III millennium B.C.E. in the upper valley of Zarafshan only lived tribes of hunters and anglers sazagans neolithic culture. However, archaeological discoveries of the last quarter century and the beginning of this century show that already in the second half of the second of IV millennium B.C.E., in Aeneolithic, there appeared ancient agriculture-centre, the development of which continued into the Bronze Age.



2. Developed materials from archive, excavation V

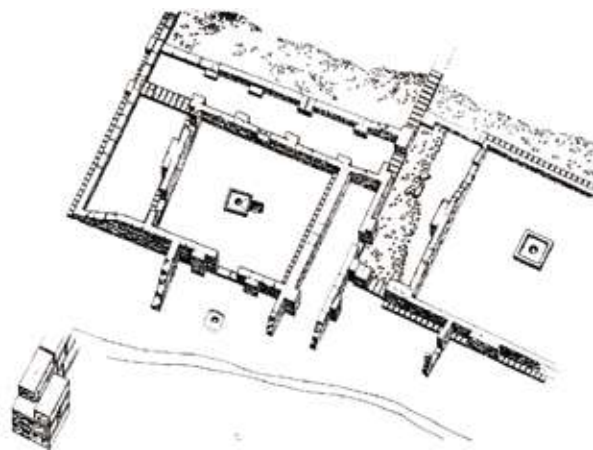


3. Type of building

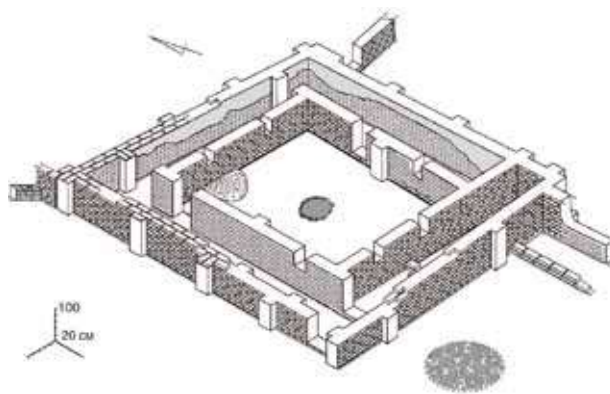
Significant contribution to the study of the development of construction in area of paleometal of Central Asia was made by Russian archaeologists as V. M Masson, I. N. Chlopin, V. I. Sarianidi, Y. E. Berezkin, N. F. Solovyov, and L. B. Kircho investigating monuments in Southern Turkmenistan which is synchronous with Sarazm. However, special work on systematization and analysis of singularities and construction of the building industry settlement Sarazm is absent. New materials, obtained in recent years in the excavation of the settlement show the uniqueness of his building culture. Comparison available Sarazama materials monuments south of Central Asia and the Middle East can not only identify the steps of the development of construction industry as the ancient production, but also it raises the question about the origin in Sarazm in some architectural forms.

IV. International significance of the project

Being the only archaeological monument in Tajikistan on the list of World Cultural Heritage, UNESCO, the research of Sarazm has a global importance. Study and solution of the problem seen in the formation of the construction business on this kind of monument makes us close to understanding the origins of historical-cultural heritage of the peoples of Central Asia.



4. Reconstruction the building from excavation IX



5. Reconstruction the building from excavation IX



New Facts about Stone Bases Karabagtepa (North Bactria)

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Introduction

Stone bases, an integral part of the column system, play an important role in the architecture of ancient Bactria. Even though they are one of the major structural elements, they were mainly used for wooden and rarely for stone columns. Bases were used more often in the construction of *aivans* (terrace) in widely migrating areas, as well as used for pilasters and anta¹.

On the archeological excavations carried out in the south of Uzbekistan, numerous stone bases of different types and species were found, which were dominantly in a torus-shape and attic. Most of them have been studied and published. But recent surveys show that there are unknown types and species in museum and school collections located near the monuments, and the architectural details that have not yet been studied by researchers. In addition, the archaeological excavations carried out in the past few decades in that area have given new materials. The purpose of this report is to analyze and reveal new features and previously unknown bases.

In 2006, at one of the hills of the famous ancient monument Khalchayan–Karabagtepa at archaeological expedition was conducted by the Fine Arts Institute, and Academy of Sciences of Uzbekistan. They found several stone bases of different profiles. Karabagtepa (in Uzbek–“*qora*” means black, “*bog*”–garden and “*tepa*” is hill) was a citadel of an antique city in Khalchayan. This settlement was located in South Uzbekistan. Occurrence of early settlements in this place is dated in 1 millennium B.C.; a big city formation occurred in 4th–3rd centuries B.C. and the development in the period of Greek-Bactrian kingdom, which were in Saka-You-ches and Kushans time (Fig. 1).

Description of bases

Of these, four stone bases are in Attic profile and almost in the same size (height: 50-60 cm, plinth: 90 x 90 x 15-20 cm, diameter of the upper surface: 65 cm). They are well preserved, and three of them were probably in situ. This was explained by the location of bases in parallel to the wall and the same distance from it. The remaining one base was smaller in size (height: 33 cm, diameter of the upper surface: 55 cm) and moved from its place. At this base, plinth is absent. Next to these databases revealed two more bases in the Attic Profile, which were two times smaller. Apparently, they were brought from the neighboring areas (Fig. 2).

On the north and east sides around the bases, there is an encircling smooth plasterboard wall (preserved height: 1,00 m, width: 1,30 m) It lies with adobes sized 50 x 25 x 10 cm. There is an entrance in the middle of the east wall 0.80 m in width. Proper positioning of bases from each other by walls allowed us to assume that they had served

as a support base columned hall or aivan built here once monumental building. The failure to preserve the colonies indicates that they were made of wood (Fig. 3).

There have previously been recorded as a stone base. New and unknown findings have increased not only in their number, but also they have enriched the species of this feature. In this sense, they are of interest. If researchers classify these bases in appearance, most of them correspond to the profile of the attic, one torus-shape, and the rest in a form of the previous two types.

Attic shape stone base of column

Attic base consists of a square plinth and is resting on it for two split shaft scotia.² The upper shaft is equipped with two (sometimes three) sticks that contribute to a smooth transition to column. At the center of the top (and often lower) bed has a square or circular connector for securing the base to the column (Fig. 4). Attic base profile was previously known not only from the excavations at Khalchayan, but also from other studied monuments of ancient Bactria. On the whole attic bases, the characteristics of Hellenistic architecture were the main structural component of Ionic, Corinthian and Composite order. On the territory of Bactria, they were common in the beginning of the 4th century B.C. Despite the similarity of appearance, their sizes and proportions are different. G. Pugachenkova analyzing this circumstance compares them with the Greco-Roman classical samples. According to her, "if, in the Vitruvius, the height of the base is placed twice in the bottom diameter of the rod string, in our case, there is no definite pattern: the ratio between the height and diameter of the base of the upper base is in the range of 1:1 to 4:7."³ And, in V. Voronina, "Central Asian bases differ from classical samples its arbitrary proportions of molding elements. Tore (swell) of profile sometimes almost the same height or upper significantly reduced. Scotia can be very narrow in comparison with the tore, which is sometimes more than twice superior in height, approximately equal to them or, conversely, overly-developed high."⁴ Certainly, the issues related to the proportions of the stone bases themselves or other structural parts order system are not yet fully understood and are a separate topic.

Torus-shape stone base of column

Among the new finds of stone bases of Karabagtepa single base was found near the excavation for field work. It represents the torus type (dimensions: overall height : 34 cm, plinth: 50 x 50 x 10 cm, diameter of the upper surface–33 cm). Usually this type is defined in appearance one (sometimes two or three rows of step) square plinth and on it rests the large torus with shelves on top. At the top of the bed has a round (or square) socket (Fig. 5).

Torus shape base found in different years at Khalchayan identical in form, but they are different in size. But they are proportional, that is, the total height in relation

database, its diameter and the torus skirting changed. If the samples of torus-shape bases of Old Termez differ from crumpled torus and smaller than the size of a plinth, with Khalchayan bases torus to the total height of massive and proportionate. Such databases and parts were found in Khalchayan palace, as well as its surroundings.

Torus-shape base back to the architectural traditions of the East and were widely used in the architecture of ancient Bactria. Samples of such bases have been found on monuments such as the Old Termez, Airtam, Hatir-Rabat, Dilberjin, Saksanahur, Ai-Khanum and Takhtisangin. In the latter has also recently been found such a base. However, a significant difference Takhtisangin base plinth is three jagged and more massive torus. Dimensions of bases in the article devoted to the results of the excavations are not shown⁵.

For the manufacture of these bases as previous findings served as the origin of the local limestone, which is quarried near Baysun mountain range. As for the art of making stone bases and other structural parts order system, as long as there is no information in the written sources. But at the present time in the literature the assumption, based on concentric tracks on the surface of the base shows that they were formed by the rotation of a certain machine.

Conclusion

Another feature of Khalchayan's architectural structures is the applications of Eastern elements (planning structure, torus-shape base, merlons-parapet and etc.) together with the traditions of mutual Greco-Roman architecture (attic bases, tiles, terracotta antefixes and etc.).

Discovering many and different architectural elements in one settlement, such as attic and torus-shape stone bases, antefixes and so on, indicates that there in the buildings, different order system was widely used under the influence of Hellenistic architecture. New findings widened types of architectural details in architecture of North Bactria. Absolutely, these new artifacts of stone bases from Khalchayan served for a study and the development of the order system in architecture of Bactria.

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¹ An anta (Latin, from ante, 'before' or 'in front of') is an architectural term describing the posts or pillars on either side of a doorway or entrance.

² Scotia — concave molding with a lower edge projecting beyond the top and so used at the base of columns as a transition between two torus moldings with different diameters.

³ Pugachenkova G.A. Fragments of Hellenistic architecture of the Right Bank of Tokharistan // TACE, II-vol., Tashkent, 1945, p. 65-81.

⁴ Voronina V.I. The construction and an artistic image in architecture of the Middle East. - Moscow, 1977, p. 63.

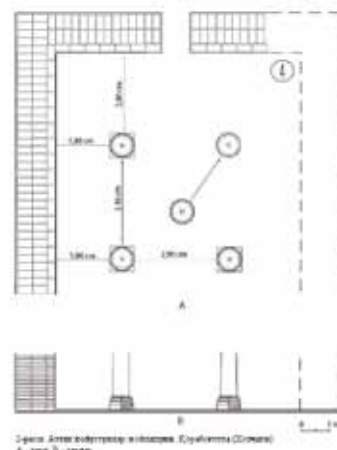
⁵ Druzhinina A., Khudzhageldiyev T., Inagaki H. The results of the archaeological excavations at Takhtisangin in 2008 // Bulletin of MIHO MUSEUM. Vol. 11, 2011, p.13-43.



1. Topographic map of ancient city in North Bactria – Khalchayan



2. View of excavation site in Karabagtepa and location of stone bases



3. Plan and section of hall or terrace, where find stone bases



4. Attic profile stone base of column



5. Torus-shape profile stone base of column

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