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INDIGENOUS TECHNOLOGY OF MASONRY ARCHITECTURE IN ASSAM

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ABSTRACT :

Traditional domestic architecture of Assam since ancient till today is based on local materials available in the region. The most common materials used in traditional domestic architecture of Assam is bamboo wood and other plant materials. Bamboo is most commonly used in construction of indigenous domestic houses. Construction of stone architecture was vogue in ancient kingdoms of Kamrupa. Stone was available in the hills and a traditional technology was applied for quarrying of stones for architectural purpose. Later bricks have been used for royal architecture particularly by the Ahom kings. In this paper, the traditional technology of quarrying stones for architectural purpose is studied. A kind of cement was also used for the purpose of brick architecture as adhesive material. This is known as Karhal, in this study the technology of making indigenous Assamese cement which is known as Karhalis also studied and described.

Keywords: *Quarrying of Stones, Brick Making, Karhal .*

I. Introduction:

Abundant architectural activity in ancient and mediaeval Assam testified by literary and epigraphic records; but only a few survives along with vast masses of shapeless ruins thrown over many an ancient site in the territory. The causes of this utter denudation of ancient monuments are not far to seek[2]. Assam is a land of heavy rainfall and violent earthquakes. Excessive rainfall leads to weakening the structure; quick growth of vegetation.Earthquakes often dislodges the foundation. In this situation a structural monument, unless properly and carefully maintained, is liable to collapse and disintegrate. In early times, except for occasional use of bricks, stone was a common building material; but the varieties of stone, available in Assam, lack the cohesive strength of their counterparts elsewhere.

The Varmana dynasty of ancient Assam was the great builders. They built many masonry structures at that time with superior architectural techniques, as descriptions are found in many ancient manuscripts. The Salastambha dynasty was next to the Varmanas who built many important religious and secular architectural monuments in ancient Assam. Many copper plates and rock inscriptions testify about their architectural activities.

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Many architectural remains in and around Tezpur proves it to be one of the very important place of architectural activities in the past. Besides Tezpur, the temples at Hajo and Kamakhya near Guwahati and Xadiya at eastern most part of Assam are still existing to prove masonry temple architecture of ancient Assam. Yuan Chwang refers to hundreds of deva temples during the 7th century A.D. The erection of temples as early as 5th - 6th century A. D. is proved by the remains of Dah Parvatiya.

In the western part of Assam the Koch kings built many important temples. According to a rock inscription the Kamakhya temple on the Nilachala hill at Guwahati was built by Sukladhwaja, the brother and general of king Naranarayana in the year 1565 A. D. Sukladhwajasa's son Raghu Rai constructed the Hayagriva Madhava temple at Hajo[1].

After the Koch Kings Ahoms were the great builders of Assam. .Ahoms in the early period built massive wooden structures .ShihabuddinTalish describes magnificent wooden palaces and elegant wooden mansions of Ahom times. Later the Ahom kings built magnificent stone and brick religious and secular structures, some of which are still existing with pride.

II.Objectives of the Study:

The main objectives in this paper are -

a) To find architectural heritage of Assam.
b) To find out indigenous technology of masonry architecture in Assam.
c) To find the technology of quarrying stones and also process of making bricks.
d) To study the making of indigenous cement by the masons of Assam.

III. Methodology:

Study on architecture and architectural technology and materials are a historical and cultural study. The methodology used in this study is mainly on study of literature available in these aspects and also by visiting architectural remains, texts available on this study are delved in different sources. For practical knowledge places with rich architectural remains is visited and studied on the spot.

IV. Discussion:

Quarrying of stones:

Hills of Assam especially those of northern side of the valley, contain many kinds of valuable stones of different colours and qualities. These stones were used for construction of temples and royal houses.During the days of the Ahom kings, the works in stone underwent a large-scale development. Large number of embankments, forts, temples, Maidams, Sil Sakos(Stone bridges) were being built. There was a special class of labourersworking in stone, who were known as *Silakutia Paik.* The different types of stones usually collected for construction

were as follows- Bokasil, Bali sil, Kakhatipathar, white, blue, black stones, Zorothsil, Lathiasil, Sotiasiletc. The stones for the famous Siv dol of Sivasagar, was collected from Naginimara. Huge pieces of stones were pierced with iron spikes. Then gun powder was introduced into the hole in the stone along with cotton fibres soaked in mustard oil. This was then sparked with fire and exploded into finer pieces. Then the pieces were slashed into slabs with the help of Chach(saw)[3].In the process of Quarrying stone, the initial blocks of the stones are removed from the living rock and sectioned by making a groove along the desired division and then sinking holes into this groove at intervals and wooden wedges were then pounded into these holes. On being wetted, the wood expands thus breaking the stone along the line of the groove. The blocks were faced first with a large iron chisel and then with a small one. Fragments of carvings found at some quarries suggests that the sculpturing of the stones was also usually done at the quarry site, although sometimes it was done after the stone had been set in its destined itself. All of this entailed accurate measurements. Transportation of stones from quarries to construction site were mostly done by on barges along rivers and streams or pulled by elephants over wooden rollers. These were lifted into place by means of rope pulleys on scaffolding. Ramps of timbers or sand were built on which to haul up exceptionally large stone slabs.

Brick Making:

Brick making was quite known to the people of Assam particularly in the Ahom period. During the rule of Ahoms, Brick making was a highly developed. From the evidence of the relics, it is believed that this industry was known to the people of Kachari Kingdom. The bricks were made by different processes and the Assamese people could make strong and beautiful bricks of different shapes and sizes with various designs on them [4].From the chronicle of the Chang Rung Phukan, it is understood that in the construction work of the temples and tombs of the kings , bricks were used in large quantities. Bricks were used in construction of palaces and other buildings too. It is said that burnt bricks were colored and made more strong and permanent by dipping these into blood of the leeches. Joktali a place near Sibsagar was famous for leeches used for this purpose[8].

Palaces and court buildings of Ahoms were constructed mainly with bricks . These structures have their own characteristics and designs. These buildings were constructed with high technical knowledge as these are still surviving after several devastating earth quakes. Talatalghar the under ground cellar palace at Rongpur, Karengghar the four storeyed royal palace at Gargaon, Rangghar the two storeyed pavilion at the parade ground of Rangpur are some of the brick built buildings of Ahoms are still existing in good condition.

Manufacturing of Cement or *Karhal*:

During the rule of Ahoms, cement was prepared for the construction of masonry buildings and thus use of cement in Assam for construction is not very old. Cement is called as *Karhal* in Assamses language. Using different ingredients, *Karhal* was manufactured. These materials

were jaggery, snail lime , stone lime, black gram (*Phaesalusaurens*), *Xon* (a kind of plant fibre) , Baralifishes, oil, resin of sal tree (*Shorearobusta*). From the historical pages*Chang-rung Phukan*,we come to know that these materials were used for manufacturing cement, for construction of the lower part of the *Maidam* of king Gadadhar Singha.

V. Conclusion:

As we all study about Architecture of our structural Heritage. Its is important to know about the materials that were used to builtthese monuments. This study is a way to show close attention to detail of the` materials that were used to construct the royal architecture, temples etc. how the materials were collected and made the materials eligible to use in the construction that are also discussed.

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