Chapter 4

(Architecture)
ARCHITECTURE

It is very difficult to give a very detailed account about the architecture of the period under study, primarily because no sufficient specimen is surviving. It is not unlikely that being made of perishable material like wood etc. they could not survive the vagaries of nature. It is also likely that some of them might still be lying buried under the soil. But with the help of literary works of this period, we can make a fairly good idea about the building activities of this phase.

Before, c.600 B.C there are little evidence of an advance material prosperity. The size of the settlements limited in area and irregular in plan represented by the two preceding cultures viz., the black and red ware and the painted gray ware. These have been confirmed by the excavations of different sites in Northern India. The noteworthy feature of the period under discussion is the origin of urban life and emergence of a number of towns, the remains of some of which have been excavated.

Walls and Roof: At Sonkh\(^1\), there is evidence of single roomed circular and oval structures of wattle and daub in the pre-Mauryan level. The evidence of various regular post-holes at different sites viz. Allahapur (Ghaziabad)\(^2\) Atranjikhera\(^3\)(Plate No.1), Jakhera\(^4\)

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\(^2\) Roy, T. N., 1986, *A study of Northern Black Polished Ware Culture*, New Delhi, P 95
and Ahichchhatra\(^5\) suggests that generally the houses and residential places were made of wood, reed or bamboo screens and later they were plastered with mud as is evidenced by the remains of chunk of clay bearing cane, reed and bamboo impressions. At Erich (Jhansi, U.P)\(^6\) and Hastinapura\(^7\) we have the evidence of cane impression and impression of reed at Singh Bhagwanpur (Rupnagar, Punjab),\(^8\) Narhan (Gorakhpur)\(^9\) and Rajghat,\(^10\) while impression of bamboo and reed, both at Chirand\(^11\) and Dewas (M.P)\(^12\). The extensive use of wood for the purpose of building construction is also reported in our literary sources such as \textit{Jataka} stories\(^13\). Probably because \textit{sala} wood was used on a large scale in construction of houses, the term \textit{sala} came to be used for variety of buildings.\(^14\)

At the excavations at Bhita and at Taxila, where in the Bhir mound several large blocks of houses dated to c. 400-200 B.C were recovered. They are more or less square in plan. It measures around 10x10 and 15x15 m. A house consisting of fifteen rooms are found arranged on three sides of an open courtyard, paved with bricks. The rooms are roofed with

\(^{5}\) Indian Archaeology, A Review (here after IAR only) 1963-64, p.43.
\(^{6}\) IAR, 1989-90, p.100.
\(^{7}\) Ancient India, Nos. 10 and 11, pp. 132 & 133.
\(^{8}\) IAR, 1980-81, p.49.
\(^{9}\) IAR, 1984-85, pp 90-91
\(^{10}\) Narain, A. K., & Roy, T. N., 1976, Excavations at Rajghat, pt I, Varanasi, p 23 & 24
\(^{11}\) Prasad, Kamleshwar., 1994, 'Transition from rural to urban settlement: A case study of Chirand' ed, Thakur, V. K., Towns in pre-modern India, Delhi, p.67, IAR. 1983-84 pp 15 & 16
\(^{13}\) No.489
\(^{14}\) Agrawala, V. S., 1953, India as known to Panini, Lucknow, p 133
terracotta tiles. According to Erdosy\textsuperscript{15} such house plans were already established in pre-Mauryan times and we consider this relevant to the period of our study.

At Hastinapura rice-husk has been used as a binding material in mud-walls. At Atranjikhera too, with rice-husk chaff has been used with mud for plaster. Again, at Hastinapura wall plasters have impressions of the plant, probably a variety of wild cane \textit{Saccharum spontaneum}. They have been used in horizontal and vertical fashion to give strength to the wall which was further reinforced by plasters of mud mixed with rice husk.\textsuperscript{16} Such methods in building \textit{kachha} houses are still prevalent in the villages in northern India. However, outside India reeds have been used even earlier for the same purpose by the people living along the river \textit{Nile} and \textit{Tigris}.\textsuperscript{17}

\textbf{Roof}: Houses must certainly have been provided with roof but unfortunately the evidences are scanty. However, we have noted that at Hastinapurara tall thick grasses such as \textit{Arundo}, \textit{Anthistiria}, \textit{Andropogon} and \textit{Saccharum} were used both for thatching the roof and making the wall. Further we noticed that even now such types of long grasses are abundantly found near

\textsuperscript{15} Erdosy, G., 1995, "City states of Northern India and Pakistan at the time of Buddha", in \textit{The Archaeology of Early Historic South Asia}, ed by Allchin, F R., pp 111-112

\textsuperscript{16} \textit{Ancient India}, nos 10 and 11 p 133

\textsuperscript{17} Childe, V G 1945, \textit{Progress and Archaeology} London p 47
Hastinapura. But in order to make a thatched roof water-proof terracotta tiles appears to have been used as reported at Nadner and Dewas. While in Mauryan and post-Mauryan period, these terracotta tiles are documented at Kausambi, Ahichchhatra, Sonkh, Rajghat and Vaisali. Probably tiles were laid down on thatched roof with the help of mud as the binding material much in the same way as the practice persists even today in almost every village. Agrawala on the authority of Panini says, “The roof of the house is called chhadis probably denoting the thatched covering known as chhappar” as we know now a day.

**Brick:** Generally, most of the people during this time lived in huts, possibly thatched with leaves and grass. Their walls were made of reed, bamboo or wood. This does not mean that structure of bricks relevant to this period are unknown to archaeology and literature. In order to ensure greater durability people started using more durable material that is bricks of clay, and wood. Clay was easily available in plenty in alluvial lands. It could be easily moulded in desired shapes. Cost variation also may not have been considerable.

We have the evidence of iron plumb-bobs from Atranjikhera, which probably helped in making the brick walls

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19 JAR, 1986-87, p 57.
20 Agrawala, V. S., op.cit, p 135
21 Gaur, R.C., op.cit, p.434
vertical. It is 300 cm in diameter. Body is rounded with a small round hook at the top. Presence of different types of bricks, such as sun-dried, baked or burnt bricks have been reported from excavations. The evidence of mud bricks has been found at Sonpur, Narhan, Atranjikhera etc. The use of baked bricks comes from Hulaskhera (Lucknow), Moradhwaj (Bijnaur), and Chechar Kutubpur (Vaisali). The earliest evidence of use of burnt bricks, after the decline of Harappan civilization, has been reported at Hastinapura in period between c.1100 BC- c.800 BC, though the area falls within the eastern limit of Indus valley civilization. With this the use of burnt bricks continues in the pre c.600 BC at Hastinapura, Ahichchhatra, Atranjikhera and Jakhera. During the period of our study the use of burnt brick has increased considerably. In c.500 BC, extensive use of such types of bricks are attested at Ujjain, Kausambi, and Jhusi (Allahabad) while in c.500 BC- c.400 BC at Chirand and Champa.

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22 Sinha B. P., 1979, *Archaeology and Art of India*, Delhi, p. 109
23 IAR 1978-79, p. 74
24 IAR, 1978-79, pp. 73 & 74
25 IAR, 1977-78, p. 17
26 Ancient India, *op cit* p. 13
27 IAR, 1963-64, p. 43
28 Gaur, R. C., *op cit*, p. 248
29 Sahi, M. D. N., *op cit*, p. 147
31 Ibid, p. 212 & 213
33 Prasad, Kamleshwar, *op cit*, p. 67
34 Sinha, B. P., *op cit*
The use of bricks for the purpose of constructing building during the period under discussion are well known to our literature. Panini\(^{35}\) mentions the word *ishtaka-Chita*, which according to Agrawala “some thing constructed with bricks” *itthaka vaddhakī* or bricklayers has been mentioned in *Pali* texts\(^{36}\). The *Vinaya Pitaka*, makes mention that Buddha permitted his disciples to use bricks for surfacing the basements and stairs of their halls or sheds\(^{37}\). Rhys Davids, perhaps, on these evidences made a general supposition that in Buddha’s times “the superstructure of all dwellings was either of wood-work or brick-works”\(^{38}\).

It appears that brick walls were provided with plasters. At Kausambi we have the evidence of lime plaster. According to Ghosh\(^{39}\) the ratio of sand and lime varies from 1:1 to 3:1. In the period under study mud was exclusively used as mortar and plaster. Usually the bricks reported in excavations are rectangular in shape but wedge-shaped also bricks have been found, used for structures such as barns, ring-wells or the wells to pave their circular rim. Their shape and size were not uniform in appearance (Table No 2). During the period under study their size vary from 60 to 20x31 75 to 16x10 to 5cm\(^{40}\).

\(^{35}\) Agrawala, V S *op cit*

\(^{36}\) Coomaraswamy, A. K., *City and City gates*, p 211

\(^{37}\) *Chullavagga of Vinaya Pitaka* Eng trans (Vinaya texts) by Rhys Davids T W and H Olden burg, *Secret Book of the East*, oxford, 1881-85, V 11 6, VI 3 11

\(^{38}\) Rhys Davids, T W, 1970, *Buddhist India*, Delhi, ninth edition, p 68


\(^{40}\) Ghosh, A., *op cit*, p 294
# Varying Size of Bricks in Use at Important Sites During the Period under Research

<table>
<thead>
<tr>
<th>Site</th>
<th>Length</th>
<th>Breath</th>
<th>Thickness</th>
</tr>
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<tbody>
<tr>
<td>Atranjikhera</td>
<td></td>
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<td></td>
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<tr>
<td>(i)</td>
<td>50.8 cm</td>
<td>30.5 cm</td>
<td>8.0 cm</td>
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<tr>
<td>(ii)</td>
<td>40.0 cm</td>
<td>46.0 cm</td>
<td>7.5 cm</td>
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<tr>
<td>(iii)</td>
<td>Max. 45.0 cm</td>
<td>Max. 30.0 cm</td>
<td>Max. 7.5 cm</td>
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<tr>
<td></td>
<td>Min. 43.0 cm</td>
<td>Min. 25.5 cm</td>
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<tr>
<td>(iv)</td>
<td>42.0 cm</td>
<td>22.0 cm</td>
<td>7.0 cm</td>
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<tr>
<td>(v)</td>
<td>37.0 cm</td>
<td>Max. 25.5 cm</td>
<td>6.3 cm</td>
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<td></td>
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<td>Min. 23.0 cm</td>
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<tr>
<td>(vi)</td>
<td>38.0 cm</td>
<td>Max. 31.0 cm</td>
<td>7.5 cm</td>
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<td></td>
<td></td>
<td>Min. 21.0 cm</td>
<td>(trapezoidal)</td>
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<tr>
<td>Hastinapura</td>
<td></td>
<td></td>
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<tr>
<td>(i)</td>
<td>44.5 cm</td>
<td>25.5 cm</td>
<td>7.0 cm</td>
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<tr>
<td>(ii)</td>
<td>37.0 cm</td>
<td>23.0 cm</td>
<td>6.3 cm</td>
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<tr>
<td>(iii)</td>
<td>30.5 cm</td>
<td>Max. 22.9 cm</td>
<td>7.0 cm</td>
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<td></td>
<td></td>
<td>Min. 15.2 cm</td>
<td>(trapezoidal)</td>
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<tr>
<td>Kausambi</td>
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<tr>
<td>(i)</td>
<td>Max. 50.8 cm</td>
<td>Max. 33.0 cm</td>
<td>Max. 8.2 cm</td>
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<tr>
<td></td>
<td>Min. 44.5 cm</td>
<td>Min. 28.0 cm</td>
<td>Min. 5.7 cm</td>
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<td></td>
<td>Aver. 45.7 cm</td>
<td>Aver. 30.5 cm</td>
<td>Aver. 6.3 cm</td>
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<tr>
<td>(ii)</td>
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<td>Sravasti</td>
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<tr>
<td>(i)</td>
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<td>23.0 cm</td>
<td>7.5 cm</td>
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<tr>
<td>(ii)</td>
<td>Min. 40.6 cm</td>
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<td>5.0 cm</td>
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</tbody>
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Table No. 2
In the light of the above discussion it may be suggested that after the Harappans the technique of making burnt-bricks was rediscovered by the people of Hastinapura. It is perhaps, from here that the technique spread further to different parts of India. It may also be postulated that the use of burnt bricks points to the economic prosperity and sophistication in life style attained by the people, though not all, in the social milieu of the time.

**Floor:** People used different types of flooring in their houses. The floor of the houses were made in two ways:

(a) by mixing clay with river gravel

(b) by using hard burnt clay (possibly from earlier structure).

The evidence of burnt clay and burnt earth floors are reported at Chirand and Rajghat.\(^1\) Mud rammed floor are noticed at Ahichchhatra, Atranjikhera and Rajghat, while, the brick rammed flooring have been found at Atranjikhera and Champa.\(^2\) At Atranjikhera, we have the evidence of twenty-seven superimposed floors. Most of them are badly damaged. Among them one has been identified with the floor belonging to a kitchen, as noted by Gaur, on the basis of broken pieces of domestic hearth found over it along with some earthen cooking pots.\(^3\)

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\(^2\) Ibid., p. 97.
\(^3\) Gaur, R.C., *op.cit*, p.247
**Hearths and Ovens:** Houses of this period had their own hearths and ovens. A row of hearths has been discovered at Atranjikhera. A hearth showing one mouth and three opening with burnt patches is also reported from here. Apart from this another hearth in 'U' shaped with cooking pots over it, also has been reported (Plate No.2). The hearths are also reported from Ahichchhatra, Kaseri, Champa and Oriup (Bhagalpur).

Generally there were two types of hearths prevalent during this period:

(a) Underground (mostly oval and sometime circular in shape)
(b) Above the ground (mainly rectangular in shape)

The hearths reported at Ahichchhatra and Kaseri are oval and underground. While, a row of four hearths found at Ahar are rectangular and above the ground. The arms and sides of the hearth at Ahar are straight and high. From the inside there are also evidence of small knob to support the small pots. Such hearths or ovens made of clay are still prevalent in the countryside.

The rows of hearths reported at Ahichchhatra, Ahar and Atranjikhera show that they were probably used for communal or

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44 *ibid.*, *IAR*, 1965-66, p 47
45 *IAR*, 1963-64, plate XXVIA
46 *IAR*, 1963-64, p 9, *IAR*, 1969-70, p 43
47 Sinha, B. P., *op cit*, p 99 & 100
48 *IAR*, 1968-69, p 6
large family cooking. Outside India, as well discovery of a row of nine fire places at Kostienki (Russia), dating back to Paleolithic times, suggest it was probably used for cooking food for large family or group of families.$^{50}$

**Sanitary Arrangement:** Sanitary arrangements were the part of domestic architecture linked with advanced urbanism. Most of the habitations were located on the bank of river or stream or water ways (as at Rajghat and Taxila). So, drinking water might have been obtained from these sources. But the drainage of water from the kitchen or privies or bathrooms of the individual houses had their own sanitary measures for the disposal of sewage as has been brought to light by excavations. These are in the form of soak-pits, ring-wells and drains.

**Privies and Soak-Pits:** Artificial pits vertical and circular in shape of greater depth are generally known as privies. While, an unnatural vertical structure, less deep and circular in shape has been termed by archaeologists as soak-pits. On the basis of the structure of pits at Rajghat, Singh$^{51}$ divided it into three types, which were used as privies and soak-pits.

(i) Simple circular pits without lining (i.e., without any terracotta rings)

(ii) Pits with a part of depth lined with terracotta rings

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$^{50}$ Childe, V G, *op cit*, p 45

$^{51}$ Singh, B P, *op cit*, pp 24-28
(iii) Pits with terracotta rings throughout depth

Of these the first type, i.e., unlined pits, was a common feature of early historical period. These are simplest form of pits used as privy or privies. At Rajghat\textsuperscript{52} the biggest circular pit used is about 2 feet in diameter, sunk to a depth of 7.14 m. In some cases (as in pits 8-13, 15 and 16 at Rajghat), they are situated close to each other. On the basis of closeness of these pits, it may probably be suggested that when the soakage capacity of one pit was exhausted another one was dug near to it or they were used all at the same time by more than one group of families.

To avoid seepage and contamination of the habitational area, the foundation of pits was dug right up to sub-soil water. Later on, to prevent the walls from collapsing inside, the pits were filled with rubbish and useless pottery vessels turned inside out. The presence of large number of complete vases of the dull red ware resembling like a modern lota, inside the pits and greenish moss at the base\textsuperscript{53} may suggest, that the vases found inside it were used as lota for carrying water by a person who used it as latrines or privies. At Rajghat\textsuperscript{54} a soak-pit of maximum depth of 4.36 m. has been reported. Its diameter varies from 73 cm to 1.03 m. All the soak-pits here are without any lining. These

\textsuperscript{52} Ibid
\textsuperscript{53} Roy, T N, op cit
\textsuperscript{54} Narain, A K, and Roy, T N, op cit, pp 56-61
pits were filled with useless broken vessels, bone, loose earth and other waste materials “between which sullage water could percolate and soak into natural soil.” A similar device for the same purpose has also been reported at various places such as Kausambi, Sravasti and Taxila.

Evidences from excavations are not enough to form a fair idea about the location and distribution of the privies or soak-pits inside the houses and along the streets largely because of small-scale excavations compounded by vertical digging.

If these soak-pits were truly privies or latrines the method of their making gives us to understand that the people during this period of time had come to attain some sophistication in their lifestyle which certainly betrays an advancement over the preceding period when such privies or soak-pits for such purposes were quite unknown. The method that has gone into the making of these soak-pits reflects that the people were technologically well aware of digging the pit deep and preventing the walls from collapsing with the aid of terracotta rings.

**Ring-Well:** Circular terracotta rings throughout their depth inside a pit, known as ring wells. Generally, the rings have a uniform diameter from top to bottom. These ring-wells varied in

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55 Roy, T N, op cit
56 IAR, 1955-56, p 20
57 Sinha, K K, 1967, *Excavations at Sravasti*, Varanasi, p 17 (Excavators however does not refer it as soak-pits)
diameter from 0.46 m – 1.37 m. The placing of rings inside the pits was essentially to check the sides from collapsing. At the same time, it enabled the sullage water to percolate and soak into natural soil.

Ring-wells with shallow depth, associated with large sized jar arranged vertically, may safely be identified as soak-pits. In fact, it is mainly the circumstantial evidence, which seems to have been taken by various investigators as the dominant factor in determining their use. Even today, ring-wells are being used in Kutch-Bhuj region as latrines. This is known as khalkuva in Gujarat. According to Pande perhaps vachchakupa is the word used for ring-wells in the Buddhist literature.

About the origin of the ring-wells Sankalia and Ghosh believed that their use started somewhere between c. 600 B.C.-c. 500 B.C. But Roy has a different opinion. He suggests its origin in c. 300 B.C. But the ring-wells reported at Kausambi, Rajghat, Nadner and an incomplete structure with a few fragments at Atranjikhera can be identified as ring-wells existing

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60 Ibid, p 217
61 Pande, B M., op cit, p 217
62 Ibid
63 Sankalia, H. D., 1960, 'Houses and Habitation through the Ages', BDCRI, pp 140-163
64 Ghosh, A., 1973, The city in Early Historical India, Simla, p 81
65 Roy, T. N., op cit, p 102
66 IAR, 1961-62, p 58
67 IAR, 1984-85, pp. 90 & 91
68 Gaur, R. C., op cit, p 248
in c 400 B C Some ring-wells are reported at Hastinapura\textsuperscript{69} with wedge-shaped brick on the upper portion. At Taxila each house had three such ring-wells, one in courtyard, second in bathroom and third in a kitchen,\textsuperscript{70} they all belong to c 500 B C. The extant evidences suggest that the people of northern India had the knowledge of terracotta ring-wells in the period under study though its common use is of later period.

**Drains:** Artificial structure to carry water or sewage away from the habitational area has been reported in excavations. In most of the houses we have the evidence of a definite hygienic arrangement. It is in the shape of *kaccha* and well built drains for the disposal of rain and dirty water. A well built brick drain upto a length of 4.90 m with a gap of 2.20 m has been reported at Champa.\textsuperscript{71} This was plastered with lime, sand and *kanker*. The width of the drain at the bottom was 25 cm, while, at the lip it was 35 cm and depth was of 52 cm. Two *kachha* drains have been reported at Atranjikhera (Plate No 2),\textsuperscript{72} one of it measures 75 cm in length, 9 cm in width and 12 cm in depth. A big drain at Nadner\textsuperscript{73} with four courses of headers and stretchers has been reported. At Rajghat\textsuperscript{74} too a *kachha* drain has been reported. It was recovered upto a length of 4.56 m and 2 m wide at the top.

\textsuperscript{69} *Ancient India*, Nos 10 & 11, p 16 & 25
\textsuperscript{70} Marshall, J., *op cit*, p 94
\textsuperscript{71} Sinha, B. P., *op cit*, p 97 & 98
\textsuperscript{72} Gaur, R C., *op cit*, p 247
\textsuperscript{73} *AR*, 1986-87, p 57
\textsuperscript{74} Roy, T N., *op cit*, p 104
The above recovered drains were probably used to carry refuse water of the adjoining houses.

**Street/Road:** Settlements of this period show evidence of roads or streets for easy movement of inhabitants of the settlements. A *kaccha* street is reported from Rajghat. It was built over the occupational debris after giving a soling of earth of about 10.2 cm in thickness containing pot-sherds, mud clods and gravel all thoroughly rammed. It was again covered by another soling of packed earth of almost 10.2 cm in thickness. Thus the section shows a total thickness of 33.1 cm. A road built in c.350 B.C and continued up to c.A.D. 300 have been reported at Kausambi. At Jakhera, according to Sahi, "The circular lay out of the road/lanes paved with a horizontally laid pottery pieces was indeed very unique in itself. Two such road/lanes, forming a pair of concentric circles were recovered to a length of 30 m. In period I, c. 700-500 B.C, at Ujjain a road of almost 24.4 feet wide, has been reported though its details have not been given. Later in period II, c. 500-200 B.C, people of the settlement seems to have added six more roads to be used, in their civic life. Banerjee pointed out to the fact that during this period roads were cobbled and were so

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75 *IAR, 1962-63, p 34*
77 Sahi, M D N., *op cit*, p 147, *IAR, 1956-57, p 20*
78 *IAR, 1957-58, p 34*
heavy frequented by wheeled wagons that these roads had permanent deep wheel marks.79

Interestingly we have the evidences of toy carts and wheels, decorated with spokes, circlets and floral motifs to play the children, made of terracotta in excavation. So, on the basis of their outer appearances we can make an idea about the different kind and designs of the cart used by the people under the period of research. The 500 carts full of different goods and grains passing through Vaisali, remind us the commercial importance of the carts in day-to-day life of the people in those days.

**Fortification and Moats:** Fortifications in archaeological context can be defined as protective or defensive works or enclosures around any habitational area with or without ditch or moat. So far our evidences points to two types of fortifications. One is generally termed as rampart and the other as embankment. People of this period may have been compelled to fortify their settlements due to: (1) frequent political disturbances, which may have resulted in invasion of a settlement by enemy or enemies; (2) safety factor from attacks by wild animals. Such types of fortification were known as rampart.

As most of the rural and urban settlements were situated on the banks of rivers, hence people had to build mud structure.

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80 Gaur, R C., *op. cit.*, p 373.
possibly encircling their habitational area as protection from annual floods. This is termed as embankment. Since most of the houses were built of mud and mud brick and provided with thatched roof, hence an embankment may have been constructed as a protective measure.

With the limited nature of excavations and paucity of details, it has not been always easy to differentiate such structural constructions from the point of view of their definite use in defence against (a) external invasion (rampart) and (b) protection against flood (embankment). However, Mate on the basis of detailed description of the structural remains in various archaeological sources has attempted to make a difference between these two forms of fortification. In his view fortification for the purpose of defence against external attack came into use not earlier than 500 B.C. Ghosh, on the other hand divides fortifications into two chronological groups:

(a) Those, which were built in c.600 B.C

(b) Those, which were constructed later, by 200-100 B.C

Roy is, however, not ready to accept the origin of rampart earlier than c.400 B.C.

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82 Mate, M S, 'Early historic fortification in the Ganga valley', Puratattva No 3 1969-70 pp 58-69
83 Ghosh, A, 1973, op cit, p 66
84 Roy, T N, Iron Age fortification in the Ganga plains, Bharati (B H U), No 17, 1987-88, pp 181-191
To trace the date of fortification and to understand its nature, we will have to examine the reported structures of this kind in pre-c.600 B.C. At Jakhera, a mud structure measuring 4.80 m in width and 1.20 m in height according to Sahi is an 'embankment.' At Kampil (Farrukhabad), the capital city of south Panchala, a mud wall of 1.70 m height has been discovered and Roy mentions that at Atranjikhera a wall made of mud measuring 7 m in width was noticed by Sahi, was probably used as embankment. The excavation at Kausambi, the capital city of ancient Vatsa Janapada reveal the use of fortification in the form of rampart belonging to c.1025 B.C and during the period under discussion the fortified wall, semi circular in shape was of over 6.5 km. The average height of the rampart is 10.50 m to 12.20 m. Unfortunately its basal width is not given. A moat has also been found at Kausambi measuring 480 feet in width. Though the period of its origin and subsequent development is not definitely known, nevertheless, it shows the presence of such structural activities in near contemporary period.

To understand clearly the origin use and development of the remains of such structures at Champa, Pataliputra, old and new Rajgir, Rajghat, Ujjain etc. one needs to examine them on the

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86 IAR, 1975-76, p.51&52.
basis of their excavation reports and related literatures, as far as possible.

**Champa:** It was the capital of *Anga Janapada* situated at the confluence of the river of the same name. Here, we have the evidence of rampart wall made of rammed earth, excavated from the ditch surrounding the fortification wall.\(^{88}\) The significance of this rampart lies in the fact that, for the first time in south Bihar we have the evidence of fortified urban center in c. 600 B.C. As an important center of trade\(^{89}\) and its political enmity with *Magadha Janapada*, might be the cause to fortify this city.

**Pataliputra:** At Bulandibagh, a suburb in modern Patna, a wooden palisade has been reported in the east-west direction up to the length of 140 m.\(^{90}\) Timber planks placed into two rows, both in horizontal and vertical shape, are joined with the help of iron nails. The inside being left hollow, probably to be used as a passage.\(^{91}\) Scholars generally identify wooden remains, with the description of timber fortification by *Megasthānes*.\(^{92}\) The earliest date of these wooden planks is assigned to c. 605 B.C - 530 B.C.\(^{93}\)

Mate\(^{94}\) has a view that this structure came into origin just for the sake of protection from flood and later on it was turned

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\(^{88}\) Sinha, B.P., *op cit*, p. 108.

\(^{89}\) *Jatak*, vol. VI, No.1, p. 298.

\(^{90}\) *Archaeological Survey of India*, Annual Report, 1926-27, p 135


\(^{93}\) *IAR*, 1971-72, p 82.

\(^{94}\) Mate, M. S., *op cit*, pp. 67 & 68.
as a military structure. The city was situated on the south bank of the river Ganga, where the Gandak and the Punpun join the main stream from the north and the south, respectively. Historically speaking, after capturing Champa, Ajatsatru founded a new stronghold at Pataligrama. Later, Udayin's choice of Pataliputra as new capital was probably due to its strategic position being located at the confluence of the two rivers. With this it became easy to control the regions north of it and give a tough fight to the Lichchavis.

Girivraga (Old Rajgir): This ancient town situated in the lap of an uneven valley with hills that served as walls on all sides. The natural gap between the hills used as gates for this ancient city. The natural defense provided by encircling hills were first reinforced by raising a high rubble wall about 40 km in circuit and generally 4 m in thickness over the hill.\(^95\) "The faces of the walls are built of massive undressed stones between 3.5 feet in length, carefully fitted and bounded together, while core between them is composed of smaller blocks carefully cut and laid with chips of fragments of stone, packing the interstices between them".\(^96\) But the interesting thing is that no mortar or cement like thing is visible anywhere in stone works.

\(^95\) Roy, T. N., op cit, (Bharat), p 186
\(^96\) Archaeological Survey of India, Annual Report, 1905-1906, p 88
New Rajgir (Rajagriha): Here at Rajgir, the habitational area has been surrounded by a earthen wall. The width of this wall was 40.33 m and extent height of 7.31 m. On its top the wall has been hardened by yellowish mud and brick bats. Along with it a moat has been discovered, the width and depth of which so far has not been determined. The original rubble fortification wall was strengthened gradually by brick wall. In southern side of habitation the wall is 2.13 m high and 1.21 m wide at the top. But Rajgir did not face the problems of flood because even the nearest river flows here at a very safe distance. With this one may probably draw the conclusion that here this wall may have been used mainly for defensive purposes (rampart).

About this structural remains, unfortunately there is no dating available. Roy is of the opinion that fortification of Rajgir was constructed between c.400 B.C.-300 B.C. But his opinion is questionable. In the absence of any definite data available from archaeological excavations, literature for the period is our main guide. Two factors seems to be responsible for the fortification at Rajgir. Firstly, the attack by king Pradyota of Avanti on Rajgriha during the life time of Bimbisara and secondly, the well-known enmity between Magadha and Anga Janapada. During the time of both the incidents Rajgir was the capital of Magadha. With the

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98 Roy, T N, op cit, (Bharati), p 186
99 Annals of the Bhandarkar Oriental Research Institute, Poona 1920-21 p 3
conquest of Anga, Magadha did not have any hostile or rival kingdom in its near east, west and south. Later on the Magadhan capital was transferred from Rajgriha to Pataliputra by king Udayin, the son of Ajatsatru. So the earliest capital city, Rajgir obviously lost its political importance and there was no need to fortify it when once the capital was transferred to Pataliputra. In the light of our above discussion it may be safely concluded that the rampart or defensive wall at Rajgriha may belong to c. 600 B.C-c.500 B.C.

**Rajghat:** It was the capital of Kasi Janapada. Kasi was one of the powerful kingdoms of the time of Lord Buddha and Mahavira, which was situated in a triangular area between rivers Ganga and Varuna. A very big clay wall, identified by archaeologist as rampart has been found, dating back to the first quarter of the first millennium B.C. Its maximum height is nearly 10 m. But with the publication of the excavation report, the excavator revised his earlier stand and described it as an 'embankment'. Here, we have the evidence of wooden log and beams traced along the bank of the river up to a length of 34 m. Despite heavy decomposition, the thickness has been found to vary from 3 to 5 cm. These wooden structure raised on wooden platforms preceded a mud structure. A mud wall has also been noticed.

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raised directly over the natural soil at those spot where wooden planks are not available, its height was 5.10 m and widths are 19.80 m. This massive mud structure remains has been identified as an embankment by the excavators.

The settlement during this phase as evidenced at Rajghat is encircled by a moat in the northwest and southwest direction. The remaining two directions have the two rivers namely, Ganga and Varuna as natural defense. The construction of the ditch and moat was done in two phases. In the first phase it was 7.66 m wide at the top level and 2.35 m deep, while in the second phase it was further widened up to 37.22 m and connected with these two rivers. Even in the Buddhist Jataka there is clear mention that ancient city of Varanasi has a moat and a rampart wall for the protection of the settlement. This was essential as Varanasi was one of the powerful political center and a well-known center of trade and commerce.

Ujjain: Ujjain was the capital of the southern kingdom of Avanti Janapada, situated on the eastern bank of the river Sipra. The habitation was surrounded by a mud-brick fortification in the shape of a pentagon. Its north-western end is wider in comparison to the southern end, which follows the course of the river Sipra. The fortification enclosed an area, approximately two

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103 Jataka, no 164
km, which is 74.67m wide on the eastern side with the maximum height of 13.72m. The outline of this area occupied by the rampart show several openings of varying dimensions, suggesting gateways. The rampart was built by dumping of dug up yellow and black clays to form a thick wall, with a gentle slope in the inner side.

The rivers surrounding the rampart is closer towards the west and distant towards the north, while a moat in the eastern side is found to be filled with a greenish water-borne silt. It has been found nearly 80 feet wide and 22 feet deep. Both the arms of the moat are connected to the river for water intake similar to that of the Rajghat moat. We have evidence of periodic repair of the rampart for the damage caused by floods. To strengthen the rampart, earthen fittings were given with riveted burnt bricks. During the flood season in order to save the mud fort wall from erosion, wooden sleepers (Plate No.3B) were used as unique device for the reinforcement of the defence system. These sleepers varying in length measures from 13-18 feet approximately. They are neatly cut and have straight and smooth sides with 9-inches square cross section. They are also extremely hard and are still in a good state of preservation. The sleeper account for two varieties of wood namely teak (Tectona grandis) and safed khair (Acacia ferruginea) both of which are examples of hard and strong timber. The use of timber wood for the source of
building forts has been mentioned by Kautilya. These wooden sleepers at Ujjain are found along side the river.

The above examination of the contemporary archaeological and literary evidences show that wood along with bricks were used to construct permanent and more durable houses and also to strengthen fortifications as are in evidence at different archaeological sites, such as Bhir mound (Taxila) Ujjain, Rajghat etc. The people of northern India started showing a particular awareness to the needs of civic sanitation as seen in the form of drains, soakage-pits and terracotta rings. Despite these the cities in this period do not show evidence of planning (nagara-mapana) as it was during the Harappan civilisation.

Nevertheless, the material remains reported in archaeological excavations certainly state the story of progress.

Archaeological evidences further shows that majority of the towns were originally encircled by mud-walls which were repaired strengthened and made higher from time to time. The evidence of moat along with rampart at different places such as New Rajgir Ujjain, Rajghat etc. gives us the idea that both the rampart (prakara) and the moat (parikha) were the result of the same

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106 Marshall, J., op. cit, p.3.

* The town planning is marked by uniformity, which is noticed in lay out of the town, streets, structure, brick-sizes drains etc. But these all are modern characteristic features of urban centres. In Assur, the first capital of Assyria remained without drain throughout its long history Childe, V G., 1945, Progress and Archaeology, London, p 53.
operation, namely the heaping up of earth scooped out to construct a moat. This has been recognised at all excavated sites where the rampart can be identified except those where the defence are of brick or masonry. Kauṭilya mentions that the vapra (mud rampart) should be made out of the khata (dug-up material). Moats or ditch were generally connected to river for water intake. Ujjain and Rajghat are the best examples of this.

Last but not the least, the architecture of the period as reported, in northern India, are not much impressive. It is, indeed surprising that a society which used deluxe ware called NBP and tools made of copper and iron for their daily use, war and production could not have had houses, suited to their sophisticated life style however modest they may have been. The reason for the poor survivals of structure is perhaps ecological.

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107 Ghosh, A., 1973, op cit, p 51
108 Roy, U N, 'Fortifications of cities in Ancient India,' The Indian Historical Quarterly vol XXX reprint, 1985, p 238