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Reconstructing Domestic Architecture in Ancient Pundranagar: An Ethno-Archaeological Hypothesis Based on Pāla Period Evidence

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Abstract

This paper investigates the domestic architecture of ancient Pundranagar through an ethno-archaeological reinterpretation of *existing archaeological excavation data* rather than new field excavation. Drawing on structural remains, material findings, and comparative vernacular traditions of northern Bengal, the study constructs a hypothesis on dwelling patterns during the Pāla period. While previous scholarship has largely focused on fortifications, monuments, and administrative structures, residential architecture remains poorly documented due to fragmentary evidence and limited household artifacts. By synthesizing secondary excavation data from the 1928–31 ASI investigations and the 1990s France–Bangladesh joint excavations, alongside living traditions of mud-and-brick construction, this paper proposes a more nuanced understanding of domestic spaces. The study argues that ordinary dwellings likely relied predominantly on unburnt clay walls and mixed-material construction, while burnt brick masonry was restricted to elite households and institutional structures. Roofing systems, semi-open porticos, and courtyard-based layouts are interpreted through both archaeological traces and continuing regional practices. This interdisciplinary approach offers a refined hypothesis of the socio-spatial fabric of Pundranagar and contributes to the broader discourse on ancient urbanism in Bengal.

Key words: Ancient dwelling, Ethno-Archaeology, Conjectural restoration, course of action, Ancient Urbanism.

1. Introduction

Pundranagar, one of the earliest known urban centers in Bengal, holds a pivotal place in the history of South Asian urbanism. Identified with Mahasthangarh, it is believed to have been a thriving city from as early as the 4th century BCE, serving as an administrative and cultural hub under various dynasties, including the Mauryan, Guptas, and Palas.[1] The archaeological significance of Pundranagar lies not only in its fortified layout and monumental structures but also in its domestic architecture,

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1 Akhtaruzzaman Ahmed, *Urbanism in Early Bengal*. Dhaka: Asiatic Society of Bangladesh, Dhaka, 2020.

which provides crucial insights into the societal, cultural, and environmental contexts that shaped its settlement patterns.

The study of ancient dwellings is essential in understanding how people lived, how urban spaces were organized, and how architectural responses were shaped by geography and climate. Domestic structures, unlike monumental buildings, reflect the daily lives of people, their social stratification, economic conditions, and cultural practices.[2] However, while much attention has been given to the defensive walls, religious monuments, and administrative complexes of ancient Pundranagar, limited research has focused on residential spaces and their spatial organization. This study aims to fill that gap by hypothesizing the characteristics of ancient dwellings in Pundranagar, based on available archaeological evidence, historical texts, and architectural analysis.

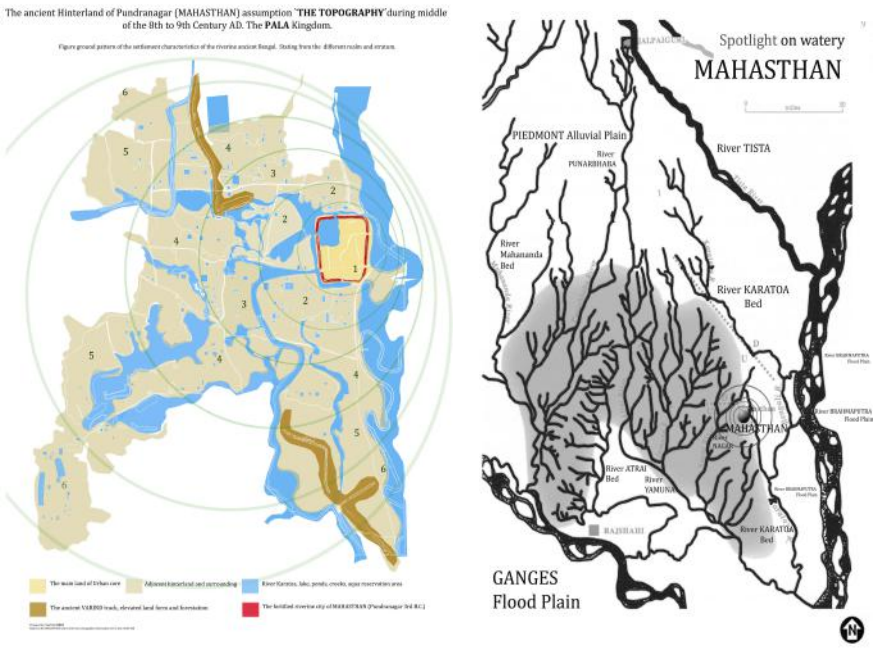

Fig. 1. Watery location and placement of ancient topography of Pundranagar, 8th -9th Century AD

2 Mahbubur Rahman Hasan, "Daily Life in Ancient Bengal: Domestic Spaces and Social Patterns", *Journal of Bengal Studies,* Vol. 12, No. 2 (2019), pp. 115–130

Archaeological excavations at Pundranagar have uncovered brick-built structures, terracotta plaques, and household artifacts, which provide insight into the residential life of the city's inhabitants.[3] Additionally, references to Pundranagar in early literary sources such as the Periplus of the Erythraean Sea and Chinese traveler accounts suggest a sophisticated urban settlement with planned housing and advanced water management systems.[4] By integrating this textual and material evidence, the study reconstructs a plausible model of ancient domestic architecture in Pundranagar.

The city flourished from the early historic period onward, serving as an administrative and cultural hub under several dynasties, including the Mauryas, Guptas, and Pālas. Although extensive research has been conducted on the fortified walls, religious monuments, and administrative complexes, domestic architecture remains understudied.

This research shifts the focus toward the everyday architecture of Pundranagar, using secondary excavation data and ethno-archaeological comparison rather than new field excavation. Such an approach allows a more grounded interpretation of ancient dwelling forms despite limited household artifacts.

2. Objective of the Research

The objectives of this research are designed to clarify the interpretive framework of the study and outline the analytical pathways through which domestic architecture in ancient Pundranagar is reconstructed. These objectives collectively support an ethno-archaeological approach that integrates excavation data, material interpretation, and comparative vernacular traditions.

Objective 1 (Spatial Reconstruction): To reconstruct the spatial organization and domestic morphology of Pundranagar using secondary excavation reports and ethno-archaeological analogies, allowing for a plausible arrangement of dwelling clusters, pathways, and settlement hierarchy.

Objective 2 (Construction Methods): To analyze construction techniques with particular emphasis on the likelihood that unburnt clay walls predominated in ordinary dwellings, while burnt-brick masonry appeared selectively among elite or institutional structures.

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3 Enamul Haque Rahman, *Archaeological Investigations at Mahasthangarh*, Rajshahi: University of Rajshahi Press, 2017

4 Nasreen Chowdhury, "Foreign Accounts of Ancient Bengal", *South Asian Historical Review,* Vol. 8, No. 1 (2016), pp 44–59

Objective 3 (Environmental & Cultural Factors): To examine how climatic conditions, environmental constraints, and cultural practices shaped the architectural character and functional organization of Pāla-period domestic spaces.

Objective 4 (Comparative Vernacular Analysis): To compare archaeological findings with extant vernacular house forms in northern Bengal, generating cross-temporal parallels that strengthen hypothetical reconstructions.

***Objective 5 (Regional Contextualization*)**: To situate the domestic architecture of Pundranagar within broader regional and early medieval urban patterns, identifying similarities and divergences with other contemporary South Asian settlements.

3. Methodology

The methodology of this research is structured to bridge archaeological datasets with ethnographic analogies, allowing for a multidimensional reconstruction of domestic architecture in ancient Pundranagar. Since household-level archaeological evidence is often fragmented, the methodological framework integrates secondary excavation reports, vernacular architectural traditions, material interpretation, and geospatial tools to formulate a coherent and scientifically grounded hypothesis.

This study adopts a hybrid methodology combining archaeological interpretation, comparative architecture, geospatial analysis, and ethno-archaeological inquiry.

3.1 Archaeological Data Review

This study does not involve primary excavation. Instead, it analyzes previously published excavation reports including those of K.N. Dikshit (1928–31) and the France–Bangladesh Joint Mission (1993–99) as secondary datasets. Structural interpretations thus remain inferential and grounded in available documentation.

3.2 Ethno-Archaeology

Living traditions of mud-based construction in northern Bengal offer a vital comparative lens, providing analogies for reconstructing incomplete architectural evidence.

3.3 Material Interpretation

Given the scarcity of domestic brick debris in several excavation trenches, the possibility that unburnt clay walls predominated in dwellings is incorporated into the hypothesis as a central assumption.

3.4 Geospatial and Architectural Reconstruction

GIS mapping, site plans, and hypothetical sketches visualize spatial organization, roofing systems, and settlement patterns based on excavation-derived layouts.

4. The Assumption and Hypothesis

The assumptions and hypothesis of this research acknowledge the interpretive nature of reconstructing domestic architecture in ancient Pundranagar. As highlighted by the reviewer, the study relies on secondary excavation data, ethnographic parallels, and regional vernacular knowledge rather than direct excavation. Therefore, the proposed architectural model remains a scientifically reasoned interpretation grounded in available evidence, not a definitive reconstruction. These assumptions stem from the fragmentary archaeological record, the scarcity of household artifacts, and the varied material traces that complicate uniform conclusions.

The hypothesis proposes that domestic architecture in Pundranagar was shaped by environmental pressures, socio-cultural dynamics, and material availability. Built forms were likely expressions of both functional necessity and cultural meaning, aligning with archaeological theories that view architecture as a symbolic and utilitarian medium. However, such interpretations must be tested against material evidence to avoid overstating symbolic functions.

Environmental adaptability, particularly in response to monsoonal rain, seasonal flooding, and the riverine landscape likely influenced the configuration of dwellings. Yet archaeological evidence shows variability in roofing styles, wall materials, and construction methods across the site. This diversity suggests that domestic architecture was not standardized but instead reflected economic condition, household needs, and access to skilled labor. This observation supports the reviewer's comment that earlier assumptions may have overstated the uniform use of burnt brick masonry.

Similarly, the integration of religious and communal functions into residential clusters though consistent with South Asian settlement traditions requires concrete archaeological indicators. Without consistent traces of shrines, votive objects, or ritual installations within dwelling contexts, such integrative interpretations must remain cautiously hypothesized. A comparative framework enhances the hypothesis further. Ancient cities such as Wari-Bateshwar and Chandraketugarh reveal similar spatial and architectural tendencies, providing reference points that help distinguish regional norms from Pundranagar-specific characteristics. Such cross-site comparison strengthens interpretive accuracy and aligns with the reviewer's observation that broader contextualization is necessary.

In essence, the assumptions and hypotheses establish a balanced, interdisciplinary foundation for interpreting domestic life in Pundranagar. Emphasizing these

interpretations require continued empirical support through typological studies, spatial analysis, and future household-level excavations to validate or refine the architectural model proposed here.

The hypothesis asserts that domestic architecture in Pundranagar was shaped by environmental, socio-cultural, and material contexts. The settlement likely featured a combination of courtyard houses, semi-open porticos, and lane-based clustering.

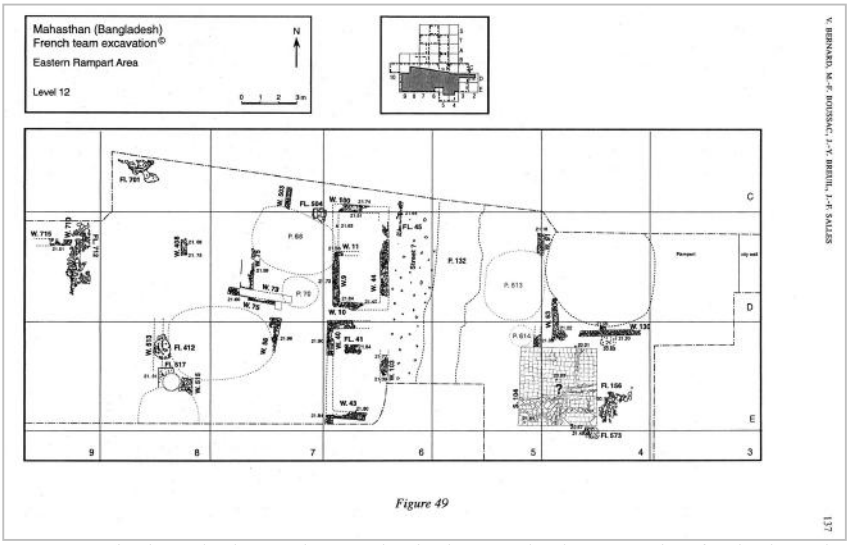

Fig. 2. Excavation layout by the French Team, showing homestead and street remains of Mahasthangarh
Source: *France-Bangladesh Joint Venture Excavations at Mahasthangarh: First Interim Report, 1993-1999*. Dhaka: Dept. of Archaeology, Ministry of Cultural Affairs, Govt. of Bangladesh.

Focusing the hypothesis within the context of the Pāla dynasty is both methodologically strategic and historically significant. The Pāla period (8th–12th centuries CE) marked a cultural and political zenith in eastern India, particularly in Bengal, during which Mahasthangarh identified with ancient Pundranagar retained its urban relevance as a regional administrative and religious center[5]. Although the city's foundation predates this era, the Pāla dynasty provides a more concrete archaeological and epigraphic framework for analyzing dwelling patterns, due to the relatively better preservation of material culture from this time. Excavations conducted between 1993 and 1999 unearthed structural remnants, such as burnt brick

5 M.A. Rahman, *Excavation Report of Mahasthan (1993–1999),* Department of Archaeology, Govt. of Bangladesh, 2000

platforms, courtyard-based residential layouts, and drainage systems that align with known Pāla urban typologies.[6] These findings offer a viable temporal anchor for hypothesizing domestic architecture, particularly when earlier periods remain poorly stratified and less materially distinct.

Moreover, the scarcity of household artifacts from earlier strata, compounded by the taphonomic loss due to river erosion and human reuse of older materials, limits our ability to make definitive claims about pre-Pāla domestic life. In contrast, the Pāla era is not only better represented in the archaeological record but is also illuminated by textual sources such as the *Ramacharitam* and the accounts of Tibetan and Chinese monks, which reference Pundranagar as a vital center of learning and habitation.[7] These literary narratives, when read alongside the structural and spatial evidence, lend credence to the hypothesis that dwellings in this period bore both symbolic and pragmatic architectural significance. Thus, while the study does not disregard earlier phases, its analytical emphasis on the Pāla dynasty ensures both temporal precision and interpretive reliability, grounded in an era with verifiable architectural continuity and socio-religious dynamism.

5. Contextual Linkage of Assumptions and Hypothesis to Archaeological Reality

The assumption and hypothesis presented in this study gain contextual clarity when examined against the spatial tendencies observed in early Bengal settlements. The domestic clusters of Pundranagar, like many ancient towns in the region, evolved in close association with religious structures. Although the archaeological record does not always provide conclusive household-level ritual evidence, broader regional patterns support the idea that stupas, shrines, and small temples were positioned near secondary streets and residential lanes. This spatial proximity between sacred and domestic spheres still visible in many old Bengal towns suggests an enduring cultural preference for integrating everyday life with spiritual landscapes. Such interpretations align with ethnographic continuity, though they must be treated as cautious assumptions in the absence of explicit material confirmation.

Archaeological findings from Mahasthan reinforce this notion, revealing a moderately dense residential fabric punctuated by slender stupas, open congregational spaces, and strategically placed temples. These features imply a settlement logic in which private and public spaces coexisted within a shared spatial order, reflecting both

6 R. C. Majumdar, *History of Ancient Bengal*, University of Dacca, 1971
7 K. A. N. Sastri, *Cultural History of India*, Oxford University Press, 1976

social cohesion and ritual accessibility. The southern and southwestern zones of the ancient city appear to have been predominantly residential, while religious monuments were situated nearby, indicating environmental, symbolic, and practical considerations influencing placement.

Roofing traditions further illustrate the adaptive nature of domestic architecture. Excavations have produced fragments of terracotta roof tiles, attesting to their ancient use, though roofing styles likely varied across economic groups. Pitched roof forms, designed to manage heavy monsoonal rainfall, were probably widespread. This climatic responsiveness, combined with functional aesthetics, shaped a visually cohesive urban landscape.

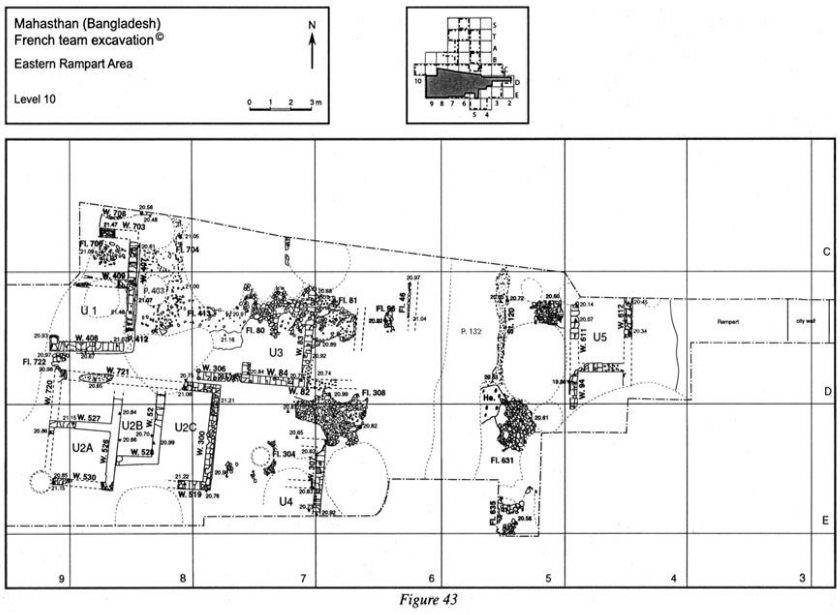

Fig. 3. French excavation at Mahasthangarh, 1996-1999
Source: *France-Bangladesh Joint Venture Excavations at Mahasthangarh: First Interim Report, 1993-1999*. Dhaka: Dept. of Archaeology, Ministry of Cultural Affairs, Govt. of Bangladesh

6. Spatial Logic and Domestic Morphology of Early Pundranagar

The dwelling patterns of ancient Pundranagar can be better understood when examined through the combined lens of architectural form, material practice, and spatial organization. Roof types, particularly the *dochala* and *chauchala* forms, played a defining role in shaping both the visual profile and climatic responsiveness

of residential structures. Their pitched configurations facilitated efficient rainwater runoff, while terracotta tiles added both durability and regional character. These roofing forms, still echoed in northern Bengal's vernacular traditions, likely lent the ancient city a textured skyline distinguished by rhythmic slopes and earthy red tones.

Residential clusters in Pundranagar likely embodied organic spatial logic, where smaller dwellings grouped around courtyards, narrow lanes, and informal streets. These clusters, interspersed with larger structures and occasional sheds, contributed to a dynamic and adaptive urban fabric. Rather than following rigid planning grids, the settlement appears to have grown incrementally, responding to household needs, social relations, and topographical conditions. This adaptive pattern aligns with broader settlement tendencies in early Bengal, where domestic zones formed the connective tissue between economic, religious, and civic spaces.

Religious structures including temples, stupas, and monastic compounds were situated near residential areas, suggesting a spatial interplay between daily life and ritual practice. This arrangement reflects an urban culture in which sacred and secular spheres were interwoven rather than separated. Such integration is consistent with both archaeological patterns and long-standing cultural practices in Bengal, where community shrines and monastic institutions often anchor neighborhood life. (Fig. 4)

Public spaces within the residential fabric were equally vital. Narrow streets, small shops, and modest open areas facilitated social interaction and commercial exchange. These everyday spaces were shaped by movement patterns rather than formal planning, resulting in winding lanes that threaded through dense domestic zones. The blurring of boundaries between private courtyards, communal pathways, and sacred nodes reflects a lived urbanism rooted in proximity and shared experience.

In material terms, construction practices varied according to economic status and functional demand. Although brick was widely used in institutional and high-status structures, domestic units likely combined unburnt clay walls with selective brickwork, especially in plinths, thresholds, or façade elements. Exposed brick surfaces, often bonded with lime mortar, contributed to the tactile and visual identity of both residential and monastic architecture, establishing a modest yet coherent aesthetic language across building types.

Monasteries and multipurpose structures played an important role within this urban ecology. Serving simultaneously as religious centers, residential quarters, and

sometimes educational nodes, they contributed significantly to the social and spatial dynamics of Pundranagar.

Temporary marketplaces composed of lightweight structures were positioned near riverbanks and circulation routes, forming economic arteries that sustained the city's livelihood. These commercial zones added density and vibrancy to the urban landscape, reinforcing the interconnectedness of domestic, religious, and economic spheres.

Dwelling units likely varied in size and status, arranged organically with narrow lanes, informal streets, and mixed-use thresholds. Market zones may have clustered near riverbanks and major paths.

Small one-storied homes with unburnt clay walls and terracotta or thatched roofs likely dominated the residential landscape. Brick facades appeared selectively, offering structural and symbolic value.

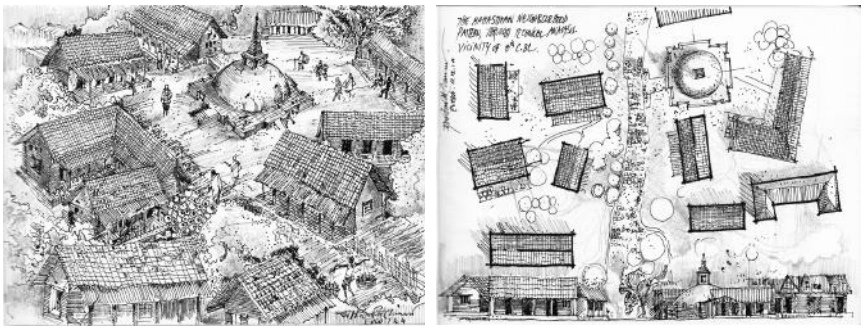

Fig. 4. Ancient vicinity, Mahasthangarh, 8th CE and religious structure (stupa) centered neighborhood
Illustration: Author

7. Monasteries settlement and Ancient Urban Fabric

The monasteries played a crucial role in the urban structure of ancient cities, offering a comprehensive vocabulary of architectural elements. The term 'comprehensive' here refers to their seamless integration with the surrounding residential areas. While monasteries were larger in scale, they contributed to a hierarchical and harmonious city fabric, blending with the everyday life of the city's inhabitants. The monasteries were designed with internal courtyards, facilitating the daily routines and activities within the community, providing both spiritual and practical functions.

In the case of Pundranagar, the riverine landscape of the Karatoa River once featured the massive brick façades of the city's structures, highlighted by the sharp finials of the temples. These structures not only dominated the landscape but also contributed to the overall visual coherence of the city, reflecting the architectural grandeur of the Buddhist city layout.

Elaborating further on the role of monasteries, temples, and stupas in the urban fabric, it becomes clear that there existed an invisible order within the Buddhist city structure. This order, perhaps driven by the spiritual and cultural principles of Buddhism, manifested in the city's layout, blending religious structures with residential areas in a way that created a harmonious environment. The integration of religious structures, including stupas, monasteries, and temples, was not only a key characteristic but also an iconic factor that defined the city's fabric.

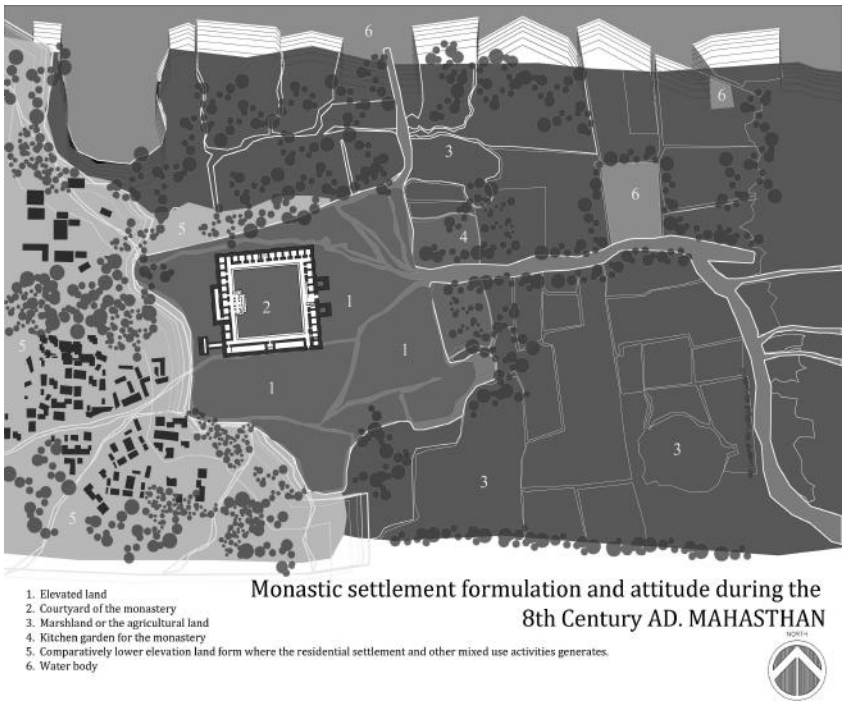

Fig. 5. Ancient settlement around the monastery, outskirt Pundranagar walled city.

In such ancient cities, the residential areas often served a mixed-use purpose, acting as the foundation for the city's urban fabric (Fig. 5). These areas were not isolated from religious or cultural spaces; instead, they coexisted with and were influenced by the presence of religious structures, creating a dynamic and interconnected urban environment.

Ancient cities, particularly those with riverine settings, were often celebrated for their royal structures and grand architectural compositions. The image of these ancient cities, especially when viewed in the context of their riverine landscapes, evokes images of towering temples surrounded by large gatherings of people, further emphasizing the central role of religious life in shaping the identity and function of the city.

Archaeological excavations were conducted at Pundranagar during the British Raj, with the earliest recorded efforts taking place in 1879 under the supervision of Alexander Cunningham, the first Director-General of the Archaeological Survey of India (ASI)[8]. Cunningham identified the site as the ancient city of Pundranagar, as mentioned in early texts. Later, between 1928 and 1931, K. N. Dikshit of the ASI carried out further excavations, uncovering structural remains, fortifications, and artifacts that confirmed Pundranagar's historical and cultural significance.[9] These British-era investigations laid the foundation for future archaeological research at the site.

Pundranagar, one of the earliest urban centers in Bengal, provides a significant archaeological record of ancient dwelling patterns. This research aims to hypothesize the spatial organization, construction techniques, and socio-cultural implications of the residential areas in this ancient city, particularly focusing on findings from archaeological excavations conducted in 1976 and 1993–1999[10]. These later excavations expanded upon the initial discoveries, providing deeper insights into the evolution of habitation structures and the urban fabric of ancient Pundranagar.

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8 A. Cunningham, *Report of a Tour in Bihar and Bengal in 1879–80*, Archaeological Survey of India Report, Vol. XV, 1879

9 K. N. Dikshit, *Excavations at Mahasthan 1928–31*, Memoirs of the Archaeological Survey of India, No. 55, 1938

10 M. M. Khan, *Mahasthan Excavation Report: 1993–94 Season*. Department of Archaeology, Bangladesh, 1994; M. S. Alam, 'Further Explorations at Mahasthan', *Journal of the Asiatic Society of Bangladesh (Hum.)*, 1999

8. Domestic Architecture Unit in Detail (8th Century AD): *Architectural Reconstruction of the Dwelling Unit*

The illustrated dwelling unit represents a restored version of an ancient house, reconstructed based on archaeological findings. Key architectural elements include:

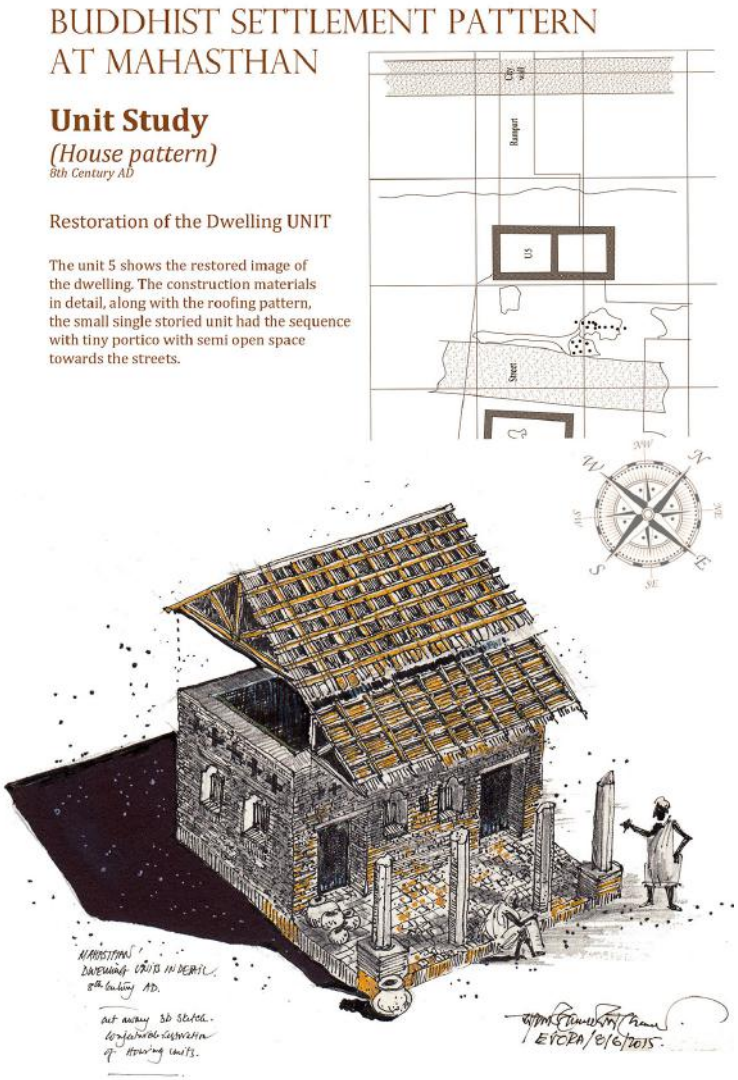

Fig. 6. Reconstruction of the dwelling unit, based on excavation. Illustration: author
Source: *France-Bangladesh Joint Venture Excavations at Mahasthangarh: First Interim Report, 1993-1999*. Dhaka: Dept. of Archaeology, Ministry of Cultural Affairs, Govt. of the People's Republic of Bangladesh

8.1 Structural Composition:

Structural Composition: The structural composition of dwellings in ancient Pundranagar reflects clear socio-economic distinctions in material selection and building methods. While elite or institutional households may have utilized burnt brick masonry valued for its durability, symbolic presence, and refined bonding

techniques, most ordinary dwellings were likely constructed using unburnt clay walls mixed with straw, husk, and pottery fragments. This pattern corresponds with excavation findings that show limited brick debris in common residential layers and supports the broader understanding of a material hierarchy within early Bengal's urban settlements. The coexistence of these construction traditions illustrates how status, resources, and functional needs shaped the architectural fabric of the city (Fig. 6).

A representative unit includes:

- Unburnt clay walls with selective use of baked brick elements
- Timber-supported sloped roofs with terracotta tiles
- Semi-open verandas facing the street (Fig. 7)
- Central or side courtyards for ventilation and ritual tasks
- Narrow passageways connecting homes to community spaces

These reconstructions reflect the synthesis of archaeological traces and contemporary ethnographic parallels.

***8.2 Roofing System**:*

- The inclined wooden truss framework supports terracotta roofing tiles, a sophisticated roofing technique that provides drainage and climate resistance.
- The interlocking perforated tiles indicate an advanced understanding of roofing technology, ensuring stability in monsoonal conditions.

***8.3 Semi-Open Portico and Entrance**:*

- The column-supported veranda acts as an interactive space, illustrating the socio-spatial hierarchy of the dwelling.
- The presence of raised stone or brick columns reflects an architectural transition towards structural enhancement.

***8.4 Interior and Functional Spaces**:*

- The unit includes a small open courtyard, possibly for ventilation, household activities, or religious functions.
- Multiple narrow windows and doorways facilitate air circulation while maintaining security and privacy.

***8.5 Urban Context and Settlement Pattern**:*

- The dwelling aligns with row-housing typologies, suggesting an interconnected settlement layout.
- A Street-facing entrance highlights the dwelling's integration into the broader urban fabric, where semi-private spaces interacted with communal areas.

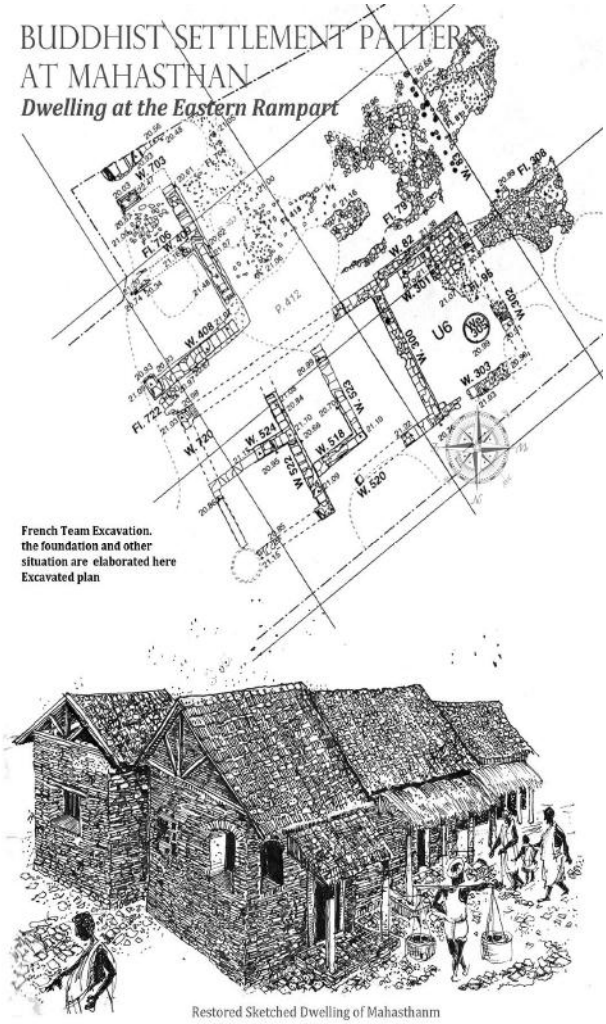

Fig. 7. Group and row housing settlement in Pundranagar

9. Archaeological and Historical Significance

- The reconstruction aligns with Pala-period urban planning, where dwellings were arranged in structured yet adaptable layouts.

- The presence of artifacts such as pottery, household tools, and terracotta elements confirms active habitation and an advanced material culture.
- The illustrated human figures and everyday objects reinforce the dwelling's role as a functional space within the settlement.

This reconstructed model (Fig.7) provides crucial insights into the architectural and socio-cultural aspects of 8th-century Pundranagar, portraying a balance between functionality, material efficiency, and climatic adaptability. The study further enhances our understanding of Bengal's early urban domestic architecture, reinforcing its significance in historical architectural discourse.

9.1 Extended Residential Block – Pundranagar Settlement

The second sketch showcases a row-type housing configuration with multiple dwelling units forming an interconnected urban fabric. Key elements include:

- **Clustered Housing Arrangement:** The layout follows an organic yet structured formation, supporting communal interactions.
- **Mixed Roofing Styles:** The combination of sloped, tiled roofs and extended thatched projections highlights architectural adaptation to climatic conditions.
- **Urban Circulation & Activity Nodes:** The depiction of market activity in front of dwellings suggests a socio-economic integration of residential and trade functions.
- **Material Continuity:** The use of brick masonry, timber reinforcements, and pottery shard-infused flooring aligns with excavation-based findings on construction practices in early medieval Bengal.

The reconstructed models of 8th-century Pundranagar dwellings, grounded in archaeological evidence from the Pāla period, illustrate a well-planned yet adaptable urban layout. They reveal the use of local materials, climate-responsive architecture, and socio-economic integration through shared spaces and trade activity. These findings deepen our understanding of Bengal's early domestic architecture and its cultural context within early medieval urbanism.

Table 1: Table Analysis: Residential Patterns and Construction Techniques in Pundranagar.

Category	Findings	Scientific Interpretation	Database Reference	Tentative Period (Pala Dynasty)
Neighborhood Pattern	The settlement exhibits a structured yet organic form, with co-existing dwelling units, mixed-use structures, and religious establishments.	The presence of defined urban matrices aligns with 8th-century AD urban planning principles in Bengal, demonstrating socio-religious influences on spatial arrangements.	Excavation reports from the French-Bangla Archaeological Team	Circa 8th–12th century AD
Construction Materials & Methods	The use of specialized Pala-period bricks (30 cm × 30 cm × 5 cm) indicates an advanced knowledge of material durability and construction technology.	High compressive and lateral strength of terracotta bricks suggests an emphasis on structural resilience and longevity.	Comparative analysis of Pala architecture and material strength studies	Circa 8th–12th century AD
Residential Structures	Evidence of wooden post-supported structures with mud walls mixed with pottery shards and baked brick fragments.	Reinforcement with pottery shards suggests early forms of composite material usage for enhanced stability.	Structural analysis of excavated dwelling remains	Circa 8th–12th century AD
Flooring Techniques	Variability in flooring from compacted clay to clay tiles; transition from thatched to terracotta-tiled roofs.	Evolution in construction materials reflects adaptation to environmental conditions and increased durability.	Excavation level stratigraphy analysis	Circa 9th–11th century AD
Roofing Systems	Fired terracotta tiles (16 cm width) with perforations for attachment, reminiscent of traditional dochala and *chouchala* designs.	The use of perforated tiles indicates an advanced roofing technique ensuring stability against climatic elements.	Comparative studies on historic Bengal roofing techniques	Circa 9th–12th century AD
Urban Fabric	Residential units arranged in row-type configurations or courtyard layouts with integrated religious structures.	Indicates a community-centric approach to urban design, balancing private and public spaces.	Settlement pattern analysis from archaeological surveys	Circa 8th–12th century AD
Architectural Vocabulary	Single-storied terracotta dwellings with porticos and semi-open spaces, blending with natural surroundings.	Suggests an ecological and contextual approach to urban aesthetics in early medieval Bengal.	Architectural survey of Mahasthan structures	Circa 8th–12th century AD

Category	Findings	Scientific Interpretation	Database Reference	Tentative Period (Pala Dynasty)
Modification Over Time	Evidence of continuous renovation, abandonment, and reconstruction of dwellings.	Demonstrates an evolving urbanism adapting to socio-environmental changes rather than a rigidly planned city.	Material and stratigraphic chronology analysis	Circa 9th–12th century AD
Infrastructure & Circulation	Narrow streets and lanes with a central axis functioning as a primary trade and interaction route.	Organic but deliberate planning likely fostered an interconnected urban framework supporting commerce and social cohesion.	Excavated pathways and traffic pattern studies	Circa 9th–12th century AD
Communal & Private Spaces	Semi-open porches, external porticos, and timber-supported spaces facilitating communal interactions.	A balance between open, semi-open, and enclosed spaces indicates socio-cultural priorities in urban form.	Comparative urban morphology studies	Circa 9th–12th century AD

Summary of the analytical table: The archaeological evidence from Pundranagar reveals a sophisticated yet adaptable urban settlement that evolved over time. The materials, spatial organization, and construction techniques underscore a deep understanding of functionality, resilience, and socio-religious principles that shaped early medieval Bengal's built environment.

10. Conclusion

The reconstruction of domestic architecture in ancient Pundranagar, as presented in this study, illustrates how early medieval urbanism in Bengal was shaped by a nuanced interplay of material availability, environmental adaptation, and socio-cultural practice. Rather than a uniform brick-built urban core, the settlement appears to have supported a stratified architectural landscape wherein unburnt clay dwellings predominated among ordinary households, while burnt-brick masonry was selectively employed by elite or institutional actors. This differentiated material culture not only aligns with the broader archaeological record of early Bengal but also responds directly to the interpretive gaps acknowledged in excavation reports.

The spatial logic of Pundranagar marked by courtyard-oriented homes, narrow organic lanes, and the close interweaving of domestic and religious structures reveals an urban fabric grounded in lived experience rather than rigid planning. The proximity of stupas, shrines, and monastic complexes to residential clusters underscores the cultural and ritual significance embedded within everyday life. This

integrated pattern mirrors long-standing settlement tendencies in the Ganges–Brahmaputra basin and affirms that religious identity was materially expressed in the architectural choices of the period.

Roofing traditions, including pitched forms supported by timber frameworks and terracotta tile coverings, further highlight the city's adaptive strategies to climatic conditions. These features together with selective brick façades and earthen construction contributed to a visually cohesive yet socially varied urban environment. The interpretive model developed in this study therefore reflects both environmental responsiveness and socio-economic differentiation, offering a more balanced reconstruction of domestic life in early Pundranagar.

The visual reconstructions and architectural illustrations presented here serve not merely as descriptive aids but as analytical tools that translate fragmentary archaeological data into coherent spatial hypotheses. By bridging textual interpretation with visual reasoning, these drawings help clarify architectural relationships that remain otherwise implicit in excavation reports. Their inclusion supports deeper scholarly engagement and opens pathways for renewed methodological reflection within South Asian architectural history.

While this study contributes a refined ethno-archaeological hypothesis for Pundranagar's domestic architecture, the city's archaeological record remains incomplete. Future excavations, especially those that target household strata, are critical for testing the assumptions proposed here. Comparative analyses with contemporaneous sites such as Wari-Bateshwar, Chandraketugarh, and Mainamati would further contextualize Pundranagar within the wider network of early Bengal urbanism. Such studies may reveal broader regional patterns or highlight distinctive architectural trajectories specific to Pundranagar.

Ultimately, the domestic landscape of Pundranagar offers an essential window into the history of urban development in early Bengal. Understanding how its inhabitants negotiated material constraints, environmental realities, and cultural priorities enriches our appreciation of early medieval life and underscores the lasting influence of these settlements on Bengal's architectural and urban traditions. This integrated approach combining archaeological evidence, vernacular parallels, and visual reconstruction provides a robust framework for future scholarship seeking to unravel the complexity of ancient Bengal's built environment.

The reconstructed dwelling patterns of Pundranagar provide essential insights into ancient urban life in Bengal. The settlement likely featured a hierarchy of material usage, climatic adaptation, and religious–domestic integration.

This hypothesis acknowledges the limitations of fragmentary evidence and emphasizes the need for future excavation specifically targeting household strata to validate or refine the proposed clay-wall dominant model.

By integrating visual documentation with textual analysis, the study contributes a holistic interpretive framework for understanding ancient urbanism in Bengal.