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Preventive Maintenance Strategy of Bara Katra

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Abstract
The paper proposes architectural conservation of historic *Bara Katra* in old *Dhaka* and a maintenance plan for its sustainable existence in the present urban landscape. *Bara Katra* is one of the two significant and similar *Mughal* structures, used as Caravan Sari in *Mughal Dhaka*. The artifact is in a dilapidated condition. The main objective of study of this paper is to ensure proper restoration for revitalization of this *Mughal* heritage and to protect the monument from decay and damages. The paper will highlight on historical values, architectural documentation, damage survey, causes of decay and form of submission. Finally it will focus on the degree of interventions and a maintenance plan within an institutional framework. Preventive maintenance strategy is recommended as an intermediate guideline to sustain the *patina of age* and aesthetic quality of the heritage building. A contextual action plan is recommended within a legal framework to allow community participation to manage transformation and prolong the life of the heritage-building.

Key words: Preservation, Restoration, Adaptive-reuse, Maintenance plan.

1. Preamble

Bara katra is situated at the southern part of *Chawk*[1], on the bank of the river *Buriganga*. It is a magnificent edifice of grand scale and one of the most important historic remains of *Mughal* period in old Dhaka, a city which is more than 400 years old. The heritage building is enlisted as protected monument by the Department of Archaeology, Bangladesh. The foundation of the building was laid in1644 AD by *Abul Qasim*, Chief Architect of the *Mughal* prince *Shah Suja* (Dani, 1962).It was located strategically to be used as caravan sari to promote trade and commerce through the river with the city. The study is carried out as a desk-top research including review of literature and through an observation of the historic area. The architectural drawings & photographs in this paper are valuable documents of the historic building. The paper may serve as useful initial report for Architectural conservation of the artifact as it includes the recent condition of the structure, site & surroundings. Moreover the suggested maintenance plan may act as useful guideline to protect the building from decay and damages. The objectives of the study are as follows:

- To suggest possible ways to recover the whole property for conservation,
- To prevent decay and manage transformation of the existing ruin and to propose restoration on the basis of authentic documents, thereby to prolong the life of the cultural heritage,
- To keep it in use and to integrate the artifact with the urban fabric ,
- To set a maintenance plan for sustainable existence of the heritage building, and
- To use cultural heritage as a means of economic development.

As significant remains of *Mughal* period the artifact is considered for its historic values. It was a landmark for the old city when approached from the river .The people of *Dhaka* has got great respect for the historic structures. The *caravan sari* is recognized as a magnificent piece of *Mughal* architecture in the region. The heritage building can be used as a cultural resource to revitalize the economic base through promotion of tourism at the area .The artifact has got use value and it can play a significant role as an important urban element through proper integration within the existing urban tissue. One of the two written inscriptions found in *BaraKatra*, declares that the foundation was laid by its builder *Abul Qasim* in 1644 A.D.

1.1 Social Dimensions

The Prince, *Shah Suja* endowed the property *(Waqf)* in 1646A.D for the comfort of the way farers to the city, the 22 rooms of the buildings were declared for shops to meet the maintenance expenses of the property with the income from those shops (Taifoor, 1956). In 1765 *Nayab-e-Nazim* of Dhaka used the building as his residence. *Charles D'oyele* (*D'oyele*, 1822) mentioned that local poor people had occupied the building.One of the major constraints to conserve the building is the complex landownership pattern. The south and west wings are used as mosque and *madrasa*, named *Jamiatul Husainia Ashraful Ulum Madrasa*. The trustee board, appointed by the Department for *Waqf*

estates looks after the mosque and *madrasa*. Central enclosed space is filled with informal settlements. The rest of the ruin is occupied by different parties for different use as shops, residences and warehouses. The *dispersed form of submission*[ii] leads to a lack of commitment to invest in proper maintenance. Department of Archaeology, Dhaka City Corporation and *Rajuk* play important role besides the trustee board and other actors.

1.2 Physical Dimensions

According to Rennel's Map (1779) "Bara Katra" enclosed a quadrangular courtyard with structures at its four sides. There were two gateways at the north and the south. The southern part was 223' long along the bank of river Buriganga. At the Middle of the riverfront, there was a three storied entrance and series of two storied structures at both of its sides, ended with two octagonal turrets. D'oyele(1822) described the building as magnificent in good shape. Dani (1962) and Taifoor (1956) described the structure widely. The following descriptions can be drawn from these authors:

The southern wing of the building is planned in a grand scale and is embellished with all the features of the imperial Mughal style. It consists of a strong built three-storied gateway in the middle of the arm, the remaining portion being two storied and bounded by prominently projected octagonal turret. A tall alcove rising up to the second story reduces the mass of this projection. Its underside is decorated with plastered network. At the angle can be seen slender tall minarets and the wall surface in between is relieved with plastered panels showing a variety of forms including four-centered, cusped, horse-shoe and flat arches. The windows of the third storey open above the apex of the alcove. Under the alcove opens the main arched doorway which leads into the guardroom, and further we pass through two successive archways into an octagonal domed hall, the ceiling of which is neatly plastered and bears various net-patterned and foliaged designs. Beyond this hall the archways repeat themselves and we are brought to the inner side of the Katra. On this inner side steps are provided that lead to the second storey. The two storied structure resolves, on either side of the gate, into a row of five barrel vaulted room on the ground floor and the living rooms with a continuous verandah on the upper. Similarly the upper floors of the gateways are furnished with living rooms. The different storeys are demarcated by blind merlons carved in plaster. The corner turret is in three stages. They are hollow and can be approached from the subsidiary structures. The space within the turret is quite sufficient to accommodate a person. (Dani, 1962) Originally the approach was from the riverside and hence the riverfront is most dominant part of the building.

The dense settlements around the artifact have resulted in visual obstacle. Inadequate space around the structure restricts proper lighting and ventilation. The narrow road network doesn't permit vehicular access. Due to unplanned development and high land value proper urban space for public gathering couldn't be provided. The narrow street known as "Bara Katra Lane" has run through the gateway, created by the remaining ruins. The open to sky space enclosed by the structure is mostly occupied by newly built structures that are used as residence, shops and warehouses. The riverbank has now moved away which was once very close to the structure. More over land filling in the area has set the ground level above the plinth of the existing ruin. Except the southern wings with gateway all other part of Bara Katra has almost disappeared. There are traces of walls and foundations of east and west wings standing with the newly built residences at east and madrasa at west side. The wings with entrance on north side have completely disappeared but the southern wings still exist as ruin with some alternation as a ruin. Addition of newly built toilet and ablution spaces on the terrace of first floor has been made. Some tin shaded structures are also added on the terrace of second floor. Though the building has small openings of traditional Mughal style entrance of ample natural lighting was ensured by increasing the number of windows. In the ground floor and staircases most of the openings are sealed that prevents the natural access of light.

1.3 Construction Technique and Material

Some of the Mughal structures around the site were studied to understand the construction method of Bara Katra. Local people and technical people were also consulted towards this end.

Soil Condition: The upper layer of the soil up to 10' to 12' deep is hard but the second layer is not as hard as the upper layer. The next two layers of sand and clay alter number of times but hard rock is found at 400' depth.

Foundation: It has a masonry foundation that is wide and deep enough. These structures of Mughal period were structurally over designed that ensure structural safety.

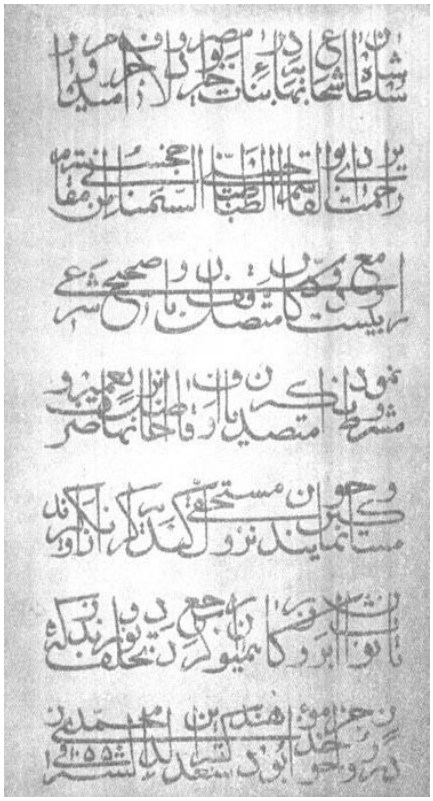
Materials: Small bricks from local clay were used in the Mughal buildings of this area. Shell lime mixed with brick dust in 1:1 ratio is to get used as mortar. Mixture of coarse brick dust and shell lime in 1:1 ratio was spread over the uneven

brick surface and rammed by bamboo sticks then lime water was dispersed over this 1.5" to 2" thick layer. Mixture of sand and fine brick dust in 1:9 ratios were mixed with lime in 1:1 ratio for another 1/8" thick layer. Lime wash: Shell were burned and meshed into powder and kept wet to get paste that was strained and mixed with blue pigment to achieve bright white color. But an unidentified material was also used to achieve adhesive quality. This ultimate product was used over the plaster inside instead of color.

Floor: Mixture of brick chips, brick dust and lime in 6:3:1 ratio was laid over the clay tiles set on the rafter (2"x2"with 10"gap between two rafters) placed over wooden beams then it was rammed. The finishing layer was laid over the first layer with addition of garlic, molasses, tamarinds, and betel nut with the mixture to make it damp proof. The finishing layer was well rammed to make it highly watertight (Hossain, 2006, b).

2. Documentation

Continuous documentation is an urgent issue for architectural conservation of *Bara Katra* as literatures, early photographs and other recordings are not available. Moreover there is no record of complete architectural survey that provides detail drawings of the north wing. *Rennel's* map, incomplete survey-drawings (1947) by the Department of Archaeology, historic descriptions, *Charles Doyl's* sketches on Dhaka and some other photographs of 50s' and 60s' can be taken as source of information .



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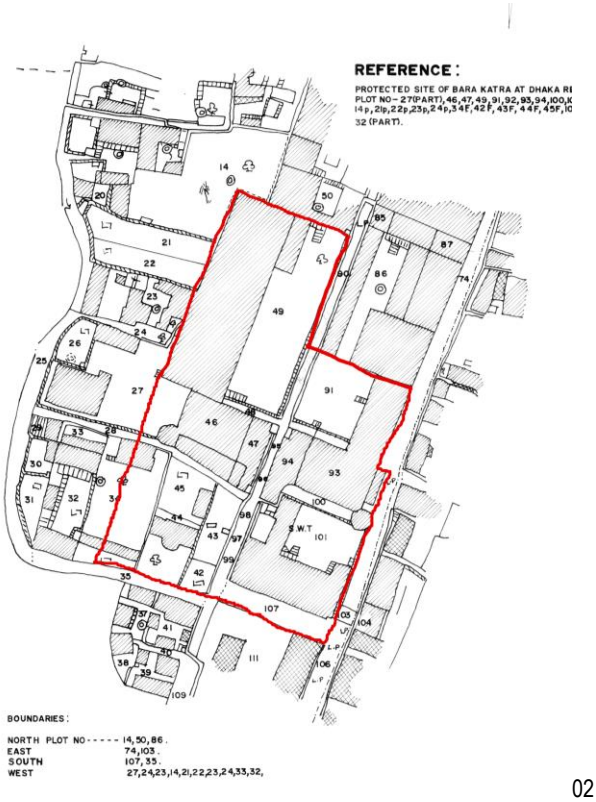

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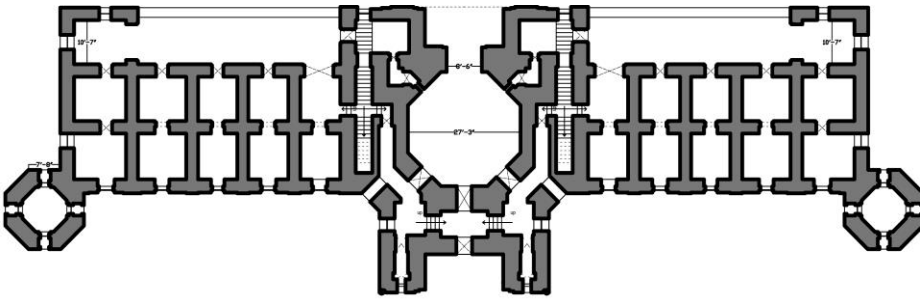
Figure 01: Inscriptions on the Northern gateway of Bara Katra, now lost (Taifoor1956)
Figure 02: Property line marked to acquire for *Bara Katra*, 1958 (source: Dept of archaeology, Bangladesh)



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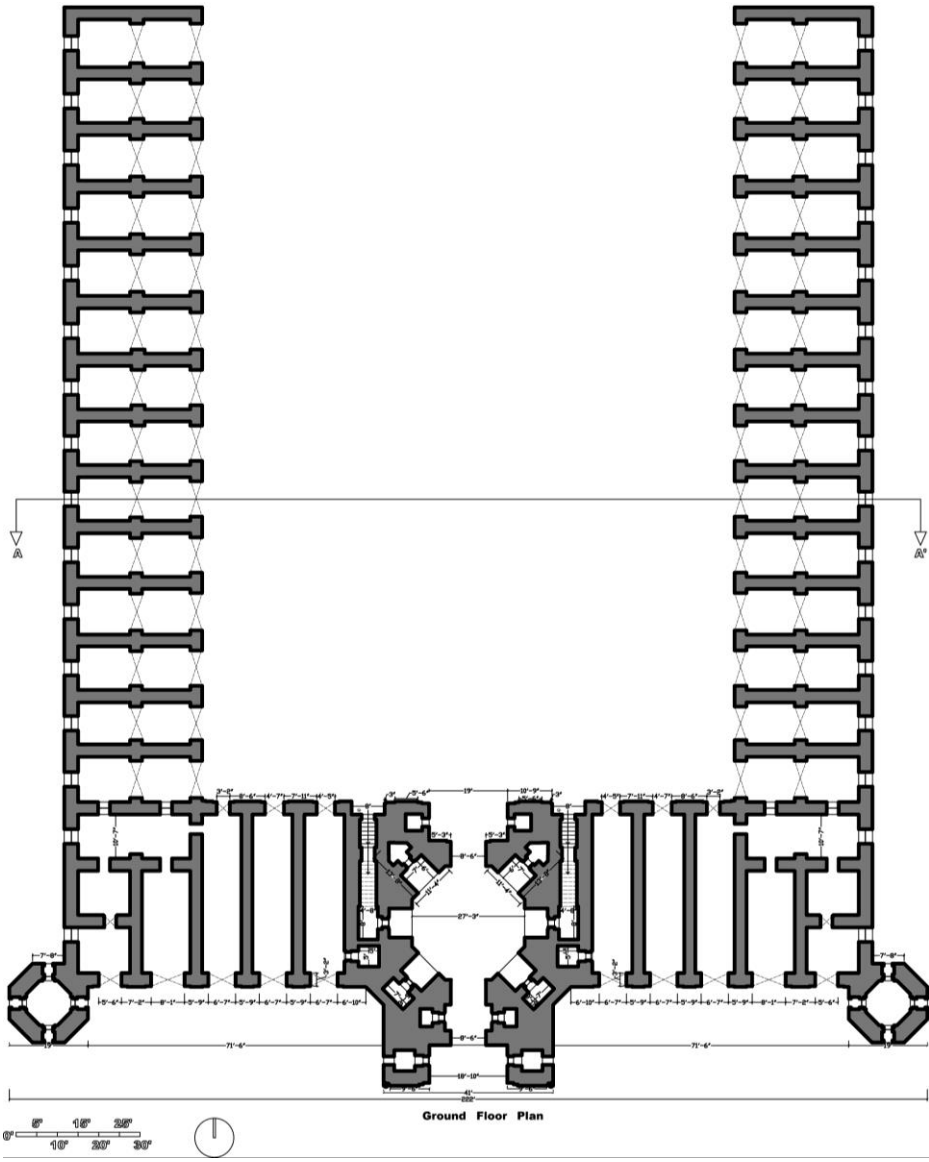

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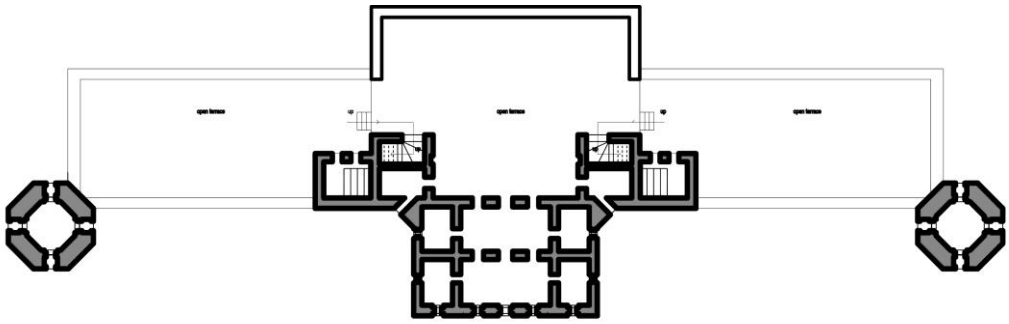
Figure 03: First Floor Plan, Source: Hossain, 2006, b.
Figure 04: Ground Floor Plan without North wing, Source: Hossain, 2006, b.



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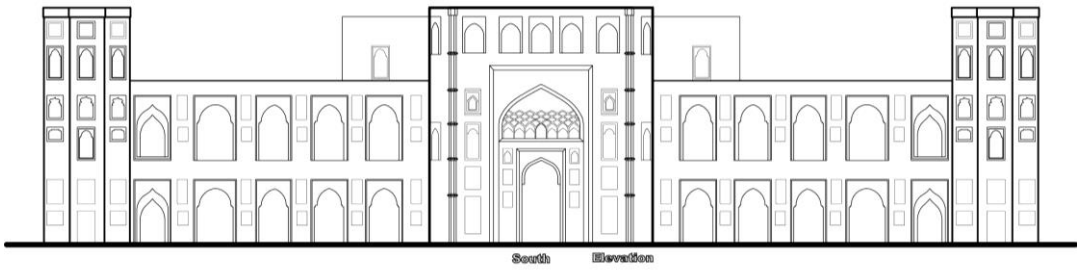

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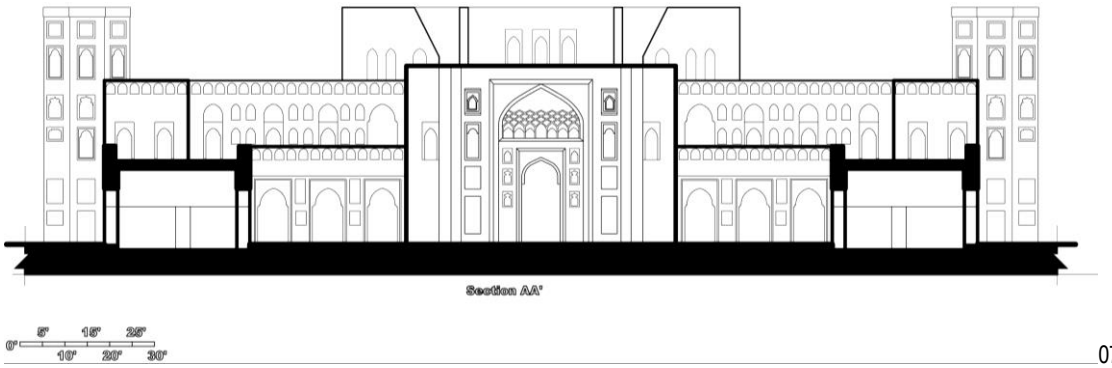

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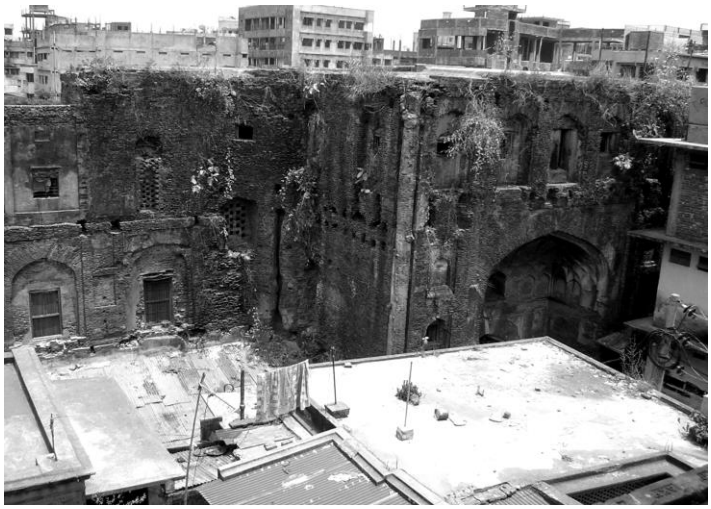
Figure 05: 2nd floor plan, Source: Hossain, 2006, b.
Figure 06: South Elevation, Source: Hossain, 2006, b.
Figure 07: Section AA', Source: Hossain, 2006, b.

3. Damage Survey

3.1 Major structural damage

Between the entrance and the octagonal turret at the east a prominent crack seems to bisect the entire southern wing. The crack is clear in elevation and both side of the slabs. The crack is now filled with cement mortar. (Hossain, 2006b.)



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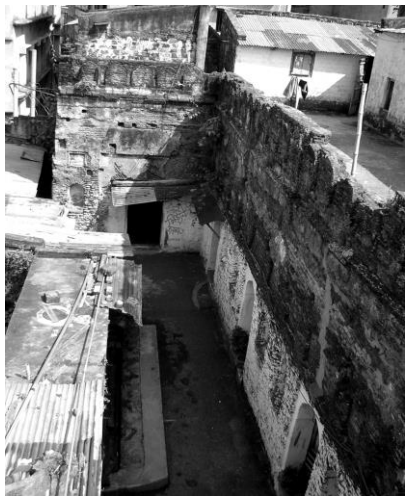

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Figure 08: Open terrace on 1st and 2nd floor
Figure 09: Existing south wing

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Figure 10: Major Crack (Source: Photograph by the Author)
Figure 11: Continuation of major crack at floor (Source: Photograph by the Author)

3.2 Roof

Prominent cracks run through the center of the barrel vault from one end to another. The free end of this vault takes the form of archway that shows the depth of the continuous crack bisecting the whole vault roof. Water leakage is found at the vault roof of first floor of east side. Moreover dampness is a common problem in most of the vault and flat roof.

3.3 Wall

Most of the original plaster has come out and in many cases traces of different layers of original plaster is exposed. Both internal and external wall has deteriorated to extent that the bricks are coming out Cracks are also found on these load bearing walls especially at the points where arches rest. Presence of vegetation is found on outer walls, resulting in cracks through their spreading roots. Efflorescence is identified from the traces of crystallized forms on the wall surface.

3.4 Floor and Staircases

The two major stairs leading to the 2nd floor from the ground floor are severely damaged. The eastern one is reconstructed but the western one is standing with damaged surface.

3.5 Rainwater Disposal and Drainage system

The finishing layer of floor is removed from most of the floor surface and the new repair works failed to maintain the slope to drain off the rainwater. Rainwater accumulates on the terrace and roof due to the lack of proper slopes to drain the water. As toilets and ambulation spaces are recently located on the terrace of second floor and the sewerage line are drawn to the west side for disposal to the main line that also causes problem.

3.6 Excess Moister

Trace of huge moisture at the floor and wall at ground floor indicates capillary action. Though dampness and moisture is a common problem for old buildings in tropical climate the excessive presence of moisture and dampness in most of the floors and walls shows serious lack of maintenance.


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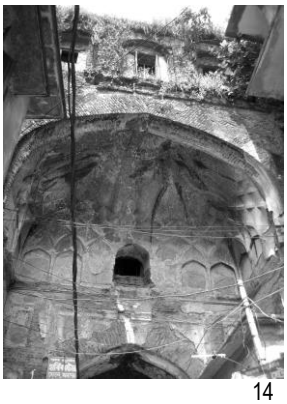
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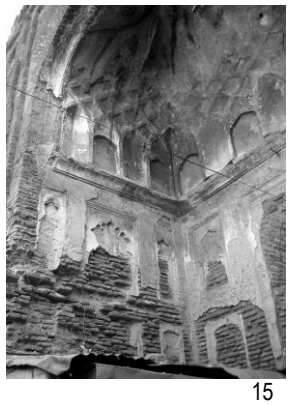
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Figure 12: Approach road from the riverbank (Source: Photograph by the Author)
Figure 13: Stair case (Source: Photograph by the Author)
Figure 14: South gate (Source: Photograph by the Author)
Figure 15: Plaster removed from wall (Source: Photograph by the Author)


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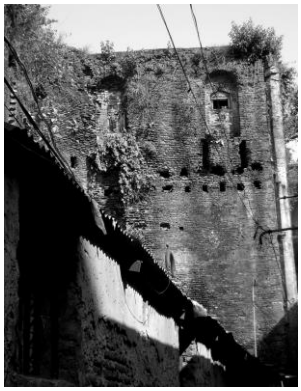
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Figure 16: Plaster detail (Source: Photograph by the Author)
Figure 17: Octagonal turret (Source: Photograph by the Author)
Figure 18: Doors (Source: Photograph by the Author)
Figure 19: Windows (Source: Photograph by the Author)

3.7 Door and Window

The old door and windows that are considered original are found in poor condition. Color, polish and most of the iron grills have disappeared. Rust in iron and deterioration of wooden surface is a common feature. Alternations are made but there is a similarity between the old and new one.

3.8 Electrical Services

Electrification services are provided without any proper planning and by surface wiring during 70's (Hossain, 2006, b.)

3.9 Decoration and finishes

Decoration work on plaster at outer wall is partly present but the internal decoration of domes at the top of the octagonal tower and entrance is still intact. Some internal walls are newly plastered over the old ones. Different colors have been used on doors, windows and wall surface recently without considering original parches or schemes.

3.10 Identified Causes of Decay

- **Climatic Causes:** Seasonal temperature variation, humidity (excessive moisture), and precipitation of rain, ground water moisture in soil dust, particulates, and dust and sand particles in air
- **Biological Causes:** Vegetations, Termites
- **Natural disaster:** Earthquake, Flood
- **Man-made Causes:** Lack of maintenance, Purposeful alternation, Traffic vibration, Vandalism and arson, Lack of security precautions, Encroachment. (Hossain, 2006, b.)

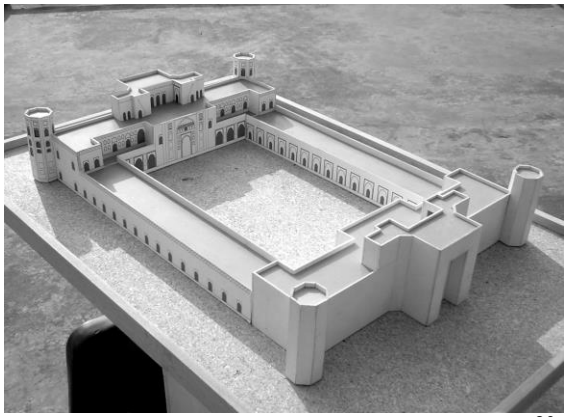

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Figure 20 & 21: Model study Source (Hossain, 2006, b)

4. Maintenance Plan

There is a need to unite the owners, users and actors on a common platform to generate collective action to conserve the heritage building. Active participation of the community and different actors may be ensured through designing a *community based programme*. The *trustee board* may be strengthen by including adequate number of representative from different actors and community to play active role with unique responsibility in wide scale within a legal framework. To remove the newly built settlements *rehabilitation programme* may be considered. Tourism may be promoted for *adaptive reuse* to revitalize the economic base (Hossain, 2006, c.). *Micro credit loans* and *capacity building* may be considered in this regard.

- Any interventions for maintenance should be carried out by the Department of Archaeology and approved by the trustee board. For technical supports consultant for such conservation can also be included in the *trustee board* or the maintenance committee.
- Preventive maintenance must get priority as strategy and necessary steps should be taken for emergency maintenance. Routine house-keeping and periodic maintenance according to suggestions of the experts should be considered.
- The rooms at ground floor may be rented out to the shops and the trustee board should select the tenant. The upper storey may be used as student dormitory; in that case tourists' access may be cautiously regulated.
- Community participation and public awareness programme may be taken up to protect and conserve the heritage artifacts. Facilities should be provided for the access of researchers, study group, journalists and other visitors.
- Part of the income from the shops may be set aside for the maintenance work. For initial investment funds may be raised from local and foreign donations. Government can provide financial assistance through Department of Archaeology. The income generated from the tourist and visitors may also be utilized for maintenance purpose.

4.1 Immediate Work

- Whole property line has to be demarcated and proper documentation should be carried out. All the illegal structures within the property should be removed and the enclosed courtyard should be vacant completely.
- Necessary repair work may be carried out to protect the monument from major structural damage that has divided the southern wing through prominent crack between entrance and octagonal turrets at east.
- Consolidation may be required for repair work at foundation level. Repair work may also be carried out for damages on structural elements like load bearing brick walls that are partly destroyed because of weak brick bonding. Arches, vault roofs that are damaged and have the possibility of collapsing may be repaired.

4.2 Urgent Work

- All biological growth including vegetation and termites that cause active deterioration on outer walls should be destroyed.
- All the temporary and permanent extension like toilet, bathroom, and ablution space on first and second floor should be removed.
- Leakage on the roof should be repaired. Proper drainage system in and around the building may be developed. To stop capillary action abstraction of water should be reduced and ground subsidence should be controlled. Damp proofing course may be carried out at plinth level and wall surface.
- Restriction on further live load and traffic vibration should be introduced.
- Restoration work should be done on the staircase that is highly damaged. Broken parts of the building especially stair at the terrace of the 2nd floor, parapets walls should be restored.
- Restoration of east and west wings should be carried out on the basis of existing ruin, drawings and documentation and archaeological evidences.

4.3 Necessary Work

- Necessary repair work to recover details on plaster at the outer and inner walls should be carefully handled. Proper finishing work in the floor and stairs based on special technical method followed in *Mughal* period should be carried out.
- Restoration of door and windows with proper details should be done and all the recent addition and changes should be substituted by original typology.
- For proper access to urban services like water supply, sanitation, waste management, garbage disposal, drainage, electricity the existing set-up should be scaled up. Electrical wiring, fittings like switch sockets, fans, and lights should be properly checked and totally replaced for safety.

4.4 Desirable Work

Vehicular and pedestrian entry into the site with parking facility may be considered. Existing road network with *Buriganga* River may be developed to ensure easy access for the visitors using river route. Existing road network should be developed to integrate the artifacts with urban fabric (Hossain, 2006, b). Surrounding the artifact, height restriction zone may be introduced to control new structures that are out of proportion or incompatible in character with the scale of the heritage building. Traffic vibration and air pollution can also be controlled in similar way.

5. Epilogue

Bara Katra is a valuable asset for the urban heritage of Dhaka. It has survived but under a pressure of the transformation in urban fabric. As it is difficult to reach at goal at a time and different efforts have failed in past to evict the existing users, contemporary use may be considered along with tourism for *adaptive reuse*. Moreover different phase may be considered for mode of operation to reach the goal. Despite many limitations a contextual maintenance plan has been drawn to revitalize the heritage building. Preventive maintenance strategy as intermediate guideline to reach the goal set in the paper can play effective role to make the artifact sustainable.

Appendix: Defining the terms.

Prevention of Deterioration: Prevention entails protecting cultural property by controlling its environment, thus preventing agents of decay and damage for becoming active (Feilden, 2003).

Preservation: Preservation deals directly with cultural property. Its objective is to keep it in its existing state .Repairs must be carried out when necessary to prevent further decay (Feilden, 2003).

Consolidation: With historic buildings, when the strength of structural elements has been so reduced that it is no longer sufficient to meet further hazards, consolidation of the existing material may have to be carried out .However the integrity of the structural system must be respected and its form preserved (Feilden, 2003).

Restoration: The object of restoration is to revive the original concept or legibility of the object. Replacement of missing or decayed parts must integrate harmoniously with the whole, must be distinguishable on close inspection from the original so that the restoration doesn't falsify archaeological or historical evidence (Feilden, 2003).

Adaptive Reuse: Adaptive Reuse, a particular type of approach, combining area conservation with the preservation of individual monuments with upgrading, and some renewal is more nuanced and flexible approach. Adaptive reuse should be accompanied by area conservation, which focuses on the conservation of urban character as well as some monuments .Legislatively this means the control of new and offensive construction and the restoration and reuse of key buildings as appropriate (Serageldin, 1996).

References

Akbar, J ; *Crisis in the Built Environment-A Case Study of Muslim* Cities, Concept Media Pte Ltd,Singapore,1988

Dani,A.H . *Dacca-A Record of Its Changing Fortune,* Asiatic Society,Dhaka,1962

D'oyele, Sir Charles; *Antiquities of Dhaka*, John Landseer, London.1822.

Fielden,Bernard.M . *Conservation of Historic Buildings,* Architectural Press,Uk,2003

Hossain, M, Sazzad(b),*Conservation and management- A report for Bara Katra* . Advance International Training Report(unpublished) Submitted at Lund University,Lund.Sweden in 2006.

Hossain, M, Sazzad(c): *Planning the Heritage Cities-A case for old Dhaka*. Published in the Conference proceedings-Society Architects & emerging Issues, 18th CAA Conference 2006. Common wealth Association of Architects and Institute of architects Bangladesh, Dhaka, 2007, p115-122.

Serageldin,Ismail :*Revitalizing Historic Cities,*- presented in the International Workshop on Architecture and Urban Conservation(December 1994) & published in1996, Centre for Built Environment ,Calcutta. P69-79.

Taifoor,S.M : *Glimpses of Old Dhaka, Dhaka. 1956 Dhaka,*

[i] *Chawk* is an ancient market-place in *Dhaka* (Dani,1962)

[ii] In the dispersed from of submission three parties share a property, one party uses it, a second party controls it, and a third party owns it.(Akbar, 1988)