



ADAPTIVE REUSE OF HERITAGE BUILDINGS

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ABSTRACT

Heritage buildings are defined as the antique architectural buildings that have stood the test of time and narrating the tale of architectural facts, histories, and wonderful past. Architectural heritage plays a vital role in tracing urban evolution and represents heritage conservation endeavors within a social frame. Adaptive reuse is a sustainable method to bring new meaning to conserving culture, manage heritage sites, and promote tourism. The purpose of this study is to understand what adaptive reuse is and how is it implied on the heritage buildings.

INTRODUCTION

Heritage buildings are pivotal in transferring the cultural identity for further generations. When the original use of heritage building is no longer in function, a new function along the preservation of heritage can be proposed. Adaptive reuse is the process of taking an old building or site and reusing it for a purpose other than it was designed. Reuse allows for a building's continued use and helps it remain a viable community asset.

Heritage building means a structure that requires preservation because of its historical, architectural, cultural, aesthetic or ecological value. Heritage links us to history, the beautiful past we inherited to preserve and transfer to our next generations it generally gives us a sense of our past and of our cultural identity. Adaptive reuse of building is an architectural conservation method that aims at retaining its heritage even as it is repurposed such that it meets the needs of the present without affecting the architectural legacy of the building. It is a movement in planning, designed to conserve old monuments & areas in order to tie a place's history to its population and culture.

NEED OF THE STUDY

To discover the aspects of adaptive reuse and its application and explain the need of adaptive reuse concept in buildings and its effectiveness on society. To study the process of buildings adapting new purpose while retaining all or most of the building features.

RESEARCH METHODOLOGY

The methodology involves study of heritage buildings and the possibilities of adaptive reuse

1.1. Criteria for heritage building

The three key concepts need to be understood to determine whether a property is worthy of listing.

- Historic significance

Historic significance is the importance of a property to the history, architecture, archaeology, engineering or culture of a community, region or nation.

- Historic integrity

Historic integrity is the authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's historic period. The property resembles historic appearance but it must also retain physical materials, design features and aspects of construction dating from the period when it attained significance.

- Historic context

Historic context is information about historic trends and properties grouped by an important theme in the history of a community, region or nation during a particular period of time. A knowledge of historic context enables listers to understand a historic property as a product of its time.

1.2. Grading for heritage building

Grading of heritage buildings

S.NO	TOPIC	GRADE 1	GRADE 2	GRADE 3
1	Definition	Heritage Grade-I comprises buildings and precincts of national or historic importance, embodying excellence in architectural style, design, technology and material usage and/or aesthetics they may be associated with a great historic event, personality, movement or institution. They have been and are the prime landmarks of the natural sites shall fall within Grade-I.	Heritage Grade-II (A&B) comprises of buildings and precincts of regional or local importance possessing special architectural or aesthetic merit, or cultural or historical significance though of a lower scale than Heritage Grade-I. They are local landmarks, which contribute to the image and identity of the region.	Heritage Grade-III comprises building and precincts of importance for townscape. These contribute to determine character of the locality and can be representative of lifestyle of a particular community or region.
2	Objective	Deserves careful preservation.	Deserves intelligent conservation.	Deserves intelligent conservation.
3	Scope of change	No interventions be permitted either on exterior or interior of the heritage building or natural features unless it is necessary in the interest of strengthening and prolonging the life of the buildings/or precincts or any part or features thereof. For this purpose, absolutely essential and minimum changes would be allowed and they must be in conformity with the original.	<u>Grade-II(A):</u> Internal changes and adaptive re-use may by and large be allowed but subject to strict scrutiny. Care would be taken to ensure the conservation of all special aspects for which it is included in Heritage GradeII. <u>Grade-II(B):</u> In addition to above, extension or additional building in the same plot or compound could in certain circumstances, be allowed provided that the extension /additional building is in harmony with the existing heritage building(s) or precincts especially in terms of height and façade.	Internal changes and adaptive re-use may by and large be allowed. Changes can include extensions and additional buildings in the same plot or compound. However, any changes should be such that they are in harmony with and should be such that they do not detract from the existing heritage building.

2.1. Reuse and redesign



Redesign

Conservation

Retain its historical, architectural ,aesthetic ,cultural significance and includes maintenance, preservation, restoration, reconstruction and adoption or a combination of more than one of these.

Preservation

Maintaining the fabric of a place in its existing state and retarding deterioration.

Restoration

returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without introducing new materials.

Reconstruction

It means and includes returning a place as nearly as possible to a known earlier state and distinguished by the introduction of materials (new or old) into the fabric.

Revitalization

Process of economic, social and cultural redevelopment of a civic area or neighbourhood.

Rehabilitation

It is usually carried out in order to extend a building's life and/or its economic viability. It may involve more adaptation than conservation, but will still preserve most of the building's original features.

Renovation

Refurbishing and/or adding to the appearance of an original building or elements of a building in an attempt to "renew" its appearance in keeping with contemporary tastes and perceptions of conservation.

Maintenance

It means the continuous protective care of a place, and its setting.

Adaptation

It means changing a place to suit the existing use or a proposed use.

2.2. Factors affecting adaptive reuse**Economic consideration**

Economic considerations includes development costs, project costs, investment returns and market.

Capital investment

It includes development and construction costs, marketing and maintenance costs. Most adaptive reuse projects depend on their economic feasibility determined by the building's existing physical configuration and condition.

Asset condition

This includes the effects during and after the adaptive reuse of building which includes the building not meeting the needs of the users, lack of structural stability and material decay.

Regulations

There is limited rules in building codes regarding the adaptive reuse and lack of encouragement by state and local government to implement the strategies and can provide high energy star rating for buildings that has undergone reuse.

Social consideration

Buildings are the heart of the society on which people's life depends. Proper maintenance and reuse of building must be done to avoid abandonment.

Environmental consideration

Buildings consume high amounts of energy during their life-cycle. New construction requires new building materials and other resources which possess high embodied energy.

2.3. Methodology**Building condition assessment**

The condition of existing building must be thoroughly assessed.

Survey of neighbourhoods

Survey of neighbourhood must be done to know the potential use and function of the building in the region.

Financial considerations

Budget is prepared based on surveys taken and finance can be approached from insurance companies, foundation and funds etc.

Architect's contract

in most of the adaptive reuse projects, architect is the leaders that work towards the success of project with deep involvement.

Detailed study of structure

- 1.foundation and basement
- 2.structural system
- 3.floor system
- 4.mechanical and electrical equipment
5. Roof and waterproofing
6. Stairways and exits
- 7.exterior wall



Interior



Structural system

Designing to save energy**Building envelope**

- a building's envelope protects it from the external weather conditions. To prevent the effects of extreme climate mechanical heating and cooling systems are used.

Windows and doors

- the fenestration in an external wall assembly are the biggest wasters of energy. This can be controlled to an extent by using multiple layered glazing systems and using low-e coatings on the glass.

Roofs

- an exposed roof is the greatest source of heat loss during cold months and heat gains during hot months, roof insulation is very important.

Floor

- the only floor that need be considered is the bottom floor. It may be a slab on grade or built over a crawl space.

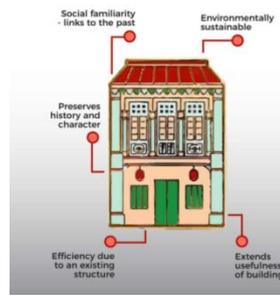
3.1. Advantages of adaptive reuse

- adaptive reuse is sustainable
- cost savings on demolition
- cost savings on building material

- saves time, faster than brand new construction
- conserves energy
- preserves the cultural heritage
- Decrease in land consumption
- Preservation Of Local Identity And Sense Of Place

3.2. BARRIERS OF ADAPTIVE REUSE

- Direct and indirect cost for conservation
- Follow building codes
- Shortage of skilled workers
- High cost of repair and maintenance
- Lengthy and difficult renovation
- Less supportive government policies



Advantages



Taj Mahal

4.1. Sustainability measures in conserving heritage building

Embodied energy conservation (eec)

Embodied energy is the energy consumed by all of the processes associated with the production of a building. However, in the case of existing heritage buildings the energy usage is reduced.

Optimizing existing traditional building performance (oetbp)

Oetbp of heritage buildings leads to achieving energy efficiencies and broader sustainability objectives. Maintenance and repairs of heritage buildings will enhance its longevity.

Reducing energy consumption in existing buildings (rec)

The installation of new sustainability measures, such as energy efficient heating, hot water systems, water tanks or other systems, would reduce the energy consumption in buildings.

Maximizing energy and water efficiencies in new work to existing building (mewe)

When new work is proposed to an existing heritage building, energy efficiency and water sustainability must be considered. Consideration could be given to :

Orientation :

The location of the new work and the orientation of windows and other openings to maximize passive heating and cooling.

Proposed construction materials: usage of energy efficient materials.

Shading devices for the new work:

The design of screens, awnings, window hoods, verandas or porches where they will not have any adverse impact on the significance of the heritage building.

Monitoring of energy and water consumption (mewc)

Establishing a management plan for monitoring future energy and water consumption in existing building, would contribute to beneficial energy efficiency and water conservation outcomes.

5.1. Literature study

5.1.1. TOWN HALL

The British built Kolkata Town Hall in 1813 in Kolkata city in India. It was designed on the Palladian-Doric roman style, which reflects the physical and functional city during that time. Main motive behind erecting such a magnificently artistic structure was to give the Europeans a venue to host their various social gatherings. Partially accessible to the public, a special committee was formed that governed the administration of the hall under specific terms and conditions.

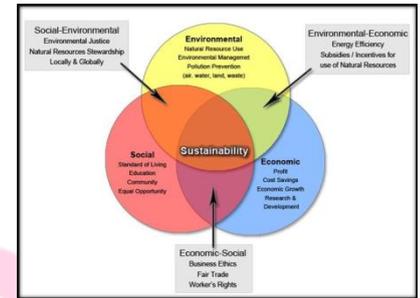
It also accommodated the municipal magistrate's courts and the offices of Kolkata Municipal Corporation (KMC), during the twentieth century. Later the building was subjected to misuse and abandonment resulting in recommendation for demolition in 1980. At that time a group of citizens objected to that decision to the government and raised awareness in public which resulted in withdrawal of the decision to demolish.



Town hall

The occupancy in the Town Hall shifted hands to the municipal authority's Justice for Peace and Improvement of the Town department, then the Bengal Legislative Council, temporary rationing office during the Second World War, Municipal Magistrate's Office, Municipal Service Commission and West Bengal Public Service Commission. Today it houses a museum, venue to host gatherings and a library accessible to the public.

Physical condition and problems



Sustainability in Adaptive reuse

Roof

The roof concrete had bond failure and allowed rainwater to penetrate in many areas. Sections of concrete detached from the ceiling in many parts. There was excessive vegetation growth on the roof and exterior walls. Skylights were damaged.

First floor

The floor was inadequately supported below and unsafe for public gatherings. Some timber planks were decayed creating dangerous gaps. Diagonal and vertical cracking was found to some arches and walls in various areas.

Ground floor

Severe dampness, efflorescence, saltpeter, decayed plaster and cracks to many parts of the walls, arches and on circular staircases were present. Much of the marble floor finishes were damaged.

Basement

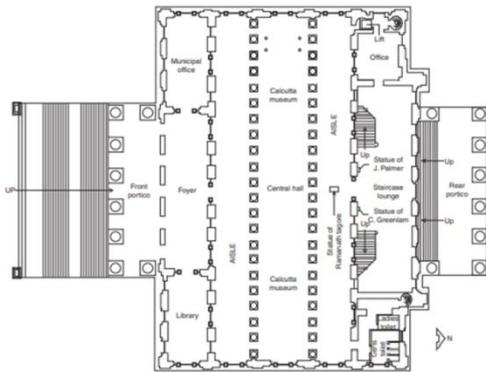
Evidence of rising damp with efflorescence, crystal formation and decayed plaster was found to entire basement walls. A poor site drainage system and broken rainwater pipes allowed flooding in the basement. Items stored in the basement had blocked many of the air vents.

Doors and windows

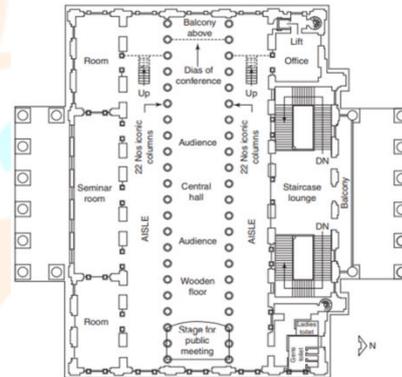
The venetian timber doors and windows showed severe damage with missing or broken frames, styles, louvers and lock-bolts. Many glazed shutters were damaged with broken glass panes.

Service systems

The electrical wires were found laid in a way which severely damaged ornamental details throughout. Toilets with leaking fixtures to the first floor had damaged the superstructure. The sanitary and plumbing pipes were aged and damaged.



Ground floor plan after renovation



First floor plan after renovation

Restoration



Repairing floor system

- Remove all vegetation and rubbish from the building.
- Restore all skylights by replacing decayed materials with new matching ones where necessary.
- Restore all ornamentations in entablature and portions of broken cornices, detail of the column capitals, columns and pilasters.
- Repair all damages to columns, entablatures, ornamentations, walls, ceiling and replaster first floor.
- Major structural strengthening of the entire first floor by two rolled-steeljoists of suitable length and section would be inserted between each existing primary and secondary timber beams.
- Repair and replace decayed timber planks to the first floor where necessary.
- Reinstall electrical installation to conform to proposed interior functions without damaging architectural details.
- Paint all external and internal parts of the building.
- All masonry walls in basement, ground and first floor were to be strengthened by filling voids by through grout injections using a slurry of cement with epoxy-based polymer and a grouting pump.
- Restore and repair all doors and windows including glazed ones, to remove existing paintings by blow-lamp application and other techniques, to apply new paint.

The process of adapting the building for reuse included many stages such as surveying existing condition, exploring the building materials, examining structural system conditions, estimating and tendering, assigning contractors, assigning restoration funds and managing the process.

Process of restoring the building for public use included repair work to different building elements such as roofs, floors, doors and windows and building services.

The building currently comprises the first high-tech story-telling museum "kolkata panorama", public gathering spaces, administrative area, academic seminar area, library and sociocultural event area.

6.1 Adaptive reuse strategies

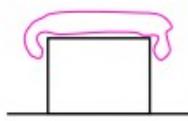


Figure 6.1.1

Wrapping

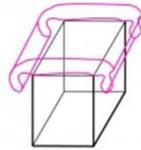


Figure 6.1.2

Weaving

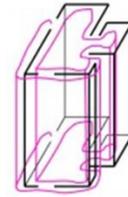


Figure 6.1.3

Juxtaposition

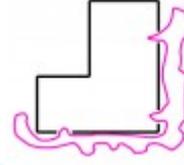


Figure 6.1.4

Parasite

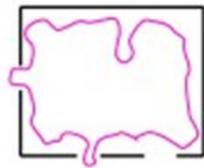
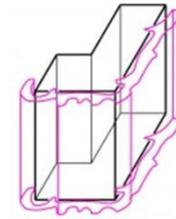
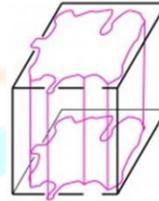


Figure 6.1.5

Insertion



7.1. Conclusion

Adaptive reuse is the recycling concept of the building and site, where the heritage is being conserved and transferred to future generations. This creates positive impact on socio-cultural and economic values, hence this concept must be encouraged in today's world.

8.1. Bibliography

<https://cpwd.gov.in/Publication/conservationheritbuildings.pdf>

<https://www.ijert.org/sustainability-and-heritage-buildings>

https://www.academia.edu/38221450/Repair_techniques_for_conservation_of_historic_structures

https://www.researchgate.net/publication/235317727_Restoration_of_Town_Hall_in_Kolkata_for_adaptive_reuse_A_case_study

