



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT

Volume 10, Issue 4, April 2023



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.580



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Flood Protecting Floating House

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ABSTRACT-Floods leads to loss of lives as well as infrastructure which affects the economy of the area for a longer duration, hence to cater the current scenario, an attempt to design a viable structure is the need of future. The aim of this paper is to study new concept of the amphibious house in lowland area as a flood mitigation measure. This report will explore and documents the various ways of protecting and creating a sustainable living environment for seaside and riverside residents. The solution will also include waterproof material and protection of vital utilities, design of buoyant foundation, vertical guidance pole attached to the foundation, which provides resistance from lateral force caused by wind and water. Amphibious Architecture adapts to dry and wet conditions without causing any damage during or after flood. The development of an amphibious community is a long time strategy that will minimize the potential risk of flooding along riverside. The proposal for this dissertation will provide sustainable structure for the people of India to create amphibious structures protected from floods.

KEYWORDS-Probabilistic cost benefit analysis.Flood risk, Mitigation techniques, floating house

I. INTRODUCTION

An amphibious house is a building that rests on the ground but whenever a flood occurs, the entire building rises up in its dock, where it floats, buoyed by the floodwater. Amphibious construction brings together standard components from the construction and marine industries to create an intelligent solution to flooding. The house itself sits in the ground and the floating base is almost invisible from the outside. Amphibious designs can vary to suit the location and owners preferences. The amphibious design allowed the floor level to be set less than 1m above the ground level instead of 2m, had the house been static. This enabled a 225sqm 3-bed dwelling to be constructed over three floors in place of the existing 1-storey 90sqm house without significantly increasing the ridge height, and therefore achieved full planning. Construction is slightly more expensive than mainstream house building due to the requirement for two foundation systems: the dock and the hull; but overall the costs are comparable to a typical basement extension, or around a 20-25% uplift on a similar size new house. The technology is ideally suited to areas of high flood-risk or if there is uncertainty regarding future flooding levels, as well as in historical or sensitive landscape settings where more heavy-handed solutions would be unacceptable. We know that due to climate changes and global warming advances, level of sea rises gradually, which leads to heavy rain, severe hurricanes tsunami, flooding and other natural disasters. Therefore there is need to adopt effective countermeasure against these disasters especially flooding. Regarding this, concept of Amphibious House has been adopted here, in which it refers to structures that will function both in land and water in response to flood in low lying areas. This configuration allows the houses to rise with the floodwater, mitigating the damage caused by the seasonal flooding. However, this concept is not new to world but still not introduced in our country "India".



Fig.1. Kerala Flood 2018

II.LITERATURE REVIEW

After I choose my project title I studied many review of literature and from that i learnt how the project have done and i have the clear idea about the project that what I should do and what I should not do. In the review of literature i found the process for lifting of house.

- 1) On the recent floods in India Kamaljit Ray, P. Pandey, C. Pandey, A. P. Dimri,* and K. Kishore Floods in the Indian subcontinent have affected habitat, population, economy, etc. Due to the detrimental effects of recent floods on the economy, governance, etc., it is imperative to understand the associated dynamics, manifestations and fallouts for proper policy planning recommendations. The present study endeavours to provide an integrated rationale of meteorological and geomorphological aspects associated with four recent extreme floods in Uttarakhand (2013), Srinagar (2014), Chennai (2015) and Gujarat (2017).

2)

2) lifting of house from low lying area to street level by using hydraulic jacks v.piriyanga, m.madhumitha this project explain the details of house lifting. lifting of house is the process of separating a building from its foundation and temporarily raising it with hydraulic screw jacks. the reason why i am choosing this project is in chennai many people was suffered and lost their accommodating due to dec 2015 flood. many people doesn't know how to overcome this problem. so that i decided this topic.

3) Mapping of Flood Risk Zones of Chandrabhaga River Around the Pilgrim City of Pandharpur by Using Remote Sensing, DEM and GIS Techniques Mustaq Ahmad Jabir Shaikh In the past, there have been severe climatic conditions occurring in most part of the earth due to climate change. As a result of this, the intensity of rainfall has increased tremendously causing flooding in many areas and countries worldwide.

III.METHODOLOGY

Evaluate the existing foundation to determine Whether it will support extended house Surveying of the residential building is to be done before starting the process of house lifting. It's important to study the existing foundation and weak members and the members of the building which requires the support before lift[1]. Load calculation Load calculation of the building is done to get the numbers of column to apply for lifting the weight of the building and the numbers of column are applied according to the area of the building. Total load of the building is depend on the capacity of air pack area.



Model is an innovation design of the floating house model for the waterfront, which was built as assemblies of manufactured production parts able to float and maintain its functional floor height above the water surface, when exposed to high tide or flood. This model is also conditioned to stay bound up on the environment order in the formal orientation and formation, and in addition no physical damage is caused by natural disasters, including the impact of earthquakes (not tsunamis). Lightweight and easily transportable, it can be built quickly and when mass produced it is relatively inexpensive Innovation Design Concept of the Model The concept of the model innovation responds to all of the threats of flooding and improves the quality of the order and the building of settlements on the Martapura river banks, Banjarmasin. The model innovation includes research and design of systems and components, such as:

- 1.A spatial system, a study of the needs of minimal space area for activities, relationships and organization of space, requirements of residential space and ecological environment
- 2.A structure system, a structure of calculations, buoyancy, construction system study, covering the terms of strength, balance and stability in flexibility, security against local climate conditions, floods and earthquakes strike (not a tsunamis).
- 3.Materials system, a study of the model is major material alternatives, which meet the criteria of design innovation aspects of waterfront architecture.





Method for project design

Attempts to answer research objectives through innovative architectural design using quantitative and qualitative methods for interpretative design by research have been applied.

Theoretical approach

The essence of architecture is the art and science of constructing buildings. Architecture is made possible by the desire of man in space to explain its order through building forms in the broadest sense. A work of architecture is a synthesis of the various forms of restrictions and possible opportunities in the design. There are three steps to be taken by people to establish their built environment, namely:

1. People must realize their built environment in accordance with the understanding of the natural surroundings.
 2. People are encouraged to complete sections that are considered less than perfect, so as to achieve a satisfactory level or one deemed fit.
 3. People tend to use symbolism to elevate their understanding into a more general level, by means of new media.
- Through these three steps, the meaning of a place is created. That is the kind of place that gave birth to the identity or characteristics of a place, or a place that has a certain spirit. As Schulz was thinking about the sense of place and the genius loci, the context of the river city is supposed to be felt in the lives of architecture and city layout. A theoretical approach builds a foundation for understanding the relationship between the medium of places and the medium of architectural works. A distinction should be made between architecture and works of architecture. An architectural work is a synthesis of architectural design decision results elaborating the concept of reflection to the context of a place and the location of the natural environment where the architecture is located. What is the relationship, between the medium condition and one another's, supporting the realization of alternative forms - functions – constructions. The theoretical approach is applied to the design concepts, conducive to extreme floods on the riverside of Banjarmasin city.

Contextual approach

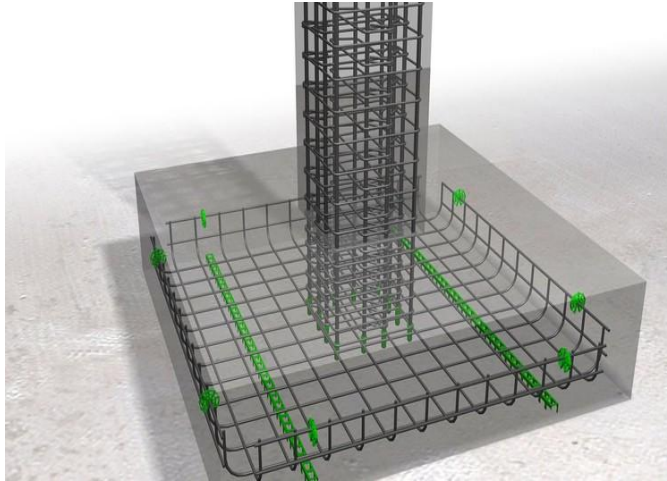
Space will be meaningful as a place if the context of local culture is taken into account⁴. This understanding is necessary for the physical design of a certain place. The river is a natural formation that divides the mainland, and may be the primary element of a city structure. The physical-spatial meeting place for water and land is a boundary (edge) called the waterfront. The character of the surface of the water's edge is the slope of the water bodies ashore. So there is a physical space that is flooded and others that are dried in the form of land. The spatial context restricts and gives an opportunity for architectural design. The attitude of the architectural designer to architecture of the city to the river should assess the typology of buildings and locations conducive to the character of this nature. This contextual approach will be made through three particulars or circumstances:

1. Natural phenomena;
2. Plug-low tide conditions;
3. Earthquake-related conditions.

The banjarmasin city contexts

Banjarmasin city is divided into parts by a river, namely the large river martapura and some medium and small-sized rivers, as well as a number of the city's canal systems (banjar tradition distinguishes these as anjir, handil and saka), which has been built by j.j.meijer since 1890, in the era of dutch colonial government. The physical context of banjarmasin city is a the lowland (16 cm below the surface of the sea) and tidal conditions positioned high and low the water surface of the river caused by the effect of the hydrodynamic barito river flow to branches of the river's tributaries. The water rises and the overall environment is partially submerged low under midnight tide conditions, eliminating the territorial limits as boundless. The image quality of the living environment's physical shape if receded is significantly different in the daytime and in the evening, the position of the river's low tide. The tidal environment fields two urban characteristics (wet and dry), because there is no city water management system. Architectural design important to noticed this context tidal, for positioning the height limits and building materials dry decent there. Their people had long been part of a culture dependent on aquatic life from the transport of water, floating markets, shower-toilet-washing, to live on the river, and on the banks of the river or on land.

IV. CONCEIT COLUMN



For actual construction conceit columns are use for holding the house at stable position. We use the cement, sand, stone and water mixture (concreit) material to make columns which is 5 to 7 foot dip in from the earth surface. Concreit columns are not link or fixed with the house Instade of this concriet columns we used pvc pipes for our model.

V. PVC SHEET

For actual construction of floating house 40mm 6x8 size sheet are use to made basemate. Approximate weight of sheet is 30kg. As per the construction area of house the sheet will be increased.



- Instead of 40 mm thick pvc sheet we used 5mm thick pvc sheet to make the base mate of our demo model.
- We make base mate of 31x17 cm and height of our base mate is 8cm. Base mate is fully air tight(empty).
- And over that 33x26 cm flooring is made.

VI. CONCLUSION

A total of 10 years of literature on flood mortality has highlighted that situational rather than generic examination of fatal accidents is required to realistically capture risky behavior during flood events. The numerous factors leading to flood fatalities are highlighted in this systematic review and have been sorted into two groups, one group relating to environmental factors and another group associated with the fatalities, even if sometimes a clear distinction cannot be



made due to the interrelations between all the relevant factors. Accordingly, strategies to reduce flood mortality have also been divided into those that try to modify environmental factors and others that try to improve the risk awareness of citizens. The complexity of the problem suggests the simultaneous implementation of both kinds of remedies to help combat flood mortality.

REFERENCES

- [1] English E., “Amphibious Foundations and the buoyant foundation project: Innovative Strategies for Floodresilient Housing,” a paper presented at the Road Map Towards a Flood Resilient Urban Environment International Conference on Urban Flood Management, 25-27 November 2009, Paris, France.
- [2] Sandhya K. (Reg. no.313012251023) April 2016, “Amphibious Architecture in India,” Da Vinci School of Design and Architecture, Karapakkam, Chennai.
- [3] Elisabeth English, Natasha Klink and Scott Turner, “Thriving with water: Developments in Amphibious Architecture in North America,” School of Architecture, University of Waterloo, Canada, FLOODrisk 2016- 3rd European Conferences on Flood Risk Management, E3S Web of Conferences.
- [4] ICAADE 2015, First International Conference on Amphibious Architecture, Design and Engineering, Bangkok, Thailand, 26-29 August 2015. <http://icaade2015.wixsite.com/icaade-2015>
- [5] Buoyant Foundation Project, Inc. www.buoyantfoundation.org
- [6] Mohamad Ibrahim Mohamad, Mohammad Ali Nekooie, Zulhilmi Bin Ismail and RoohollahTaherkhani, “Amphibious Urbanization as a Sustainable Flood Mitigation Strategy in South-East Asia,” Advanced Materials Research, Vols. 622-623, pp. 1696-1700, 2013.
- [7] Case study of ‘The Thames Amphibious House’. www.construction21.org



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