

Flood Resilient Design Techniques and Materials

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ABSTRACT

Floods are defined as high streams, flows that overflow natural or artificial river or stream banks and are significantly higher than normal, as well as inundation of low ground. The current approach to overlooking resilience technique is the subject of this research. Resilient construction should be considered as part of a larger climate change strategy. More than one and a half billion people live on riverbanks or coastal flood plains, according to geophysical studies. Integrated design for resilience is a method of proactively delivering a functional and useable built environment by combining design, planning, engineering, social, and political solutions. This study is about how to control the after-flood flood situation using flood resilient techniques. Climate change uncertainty has resulted in a shift toward flood resilience, which aids in dealing with unforeseen climatic perturbations that affect extreme flows.

Key words: flood resilient techniques, materials, flood causes, climate change .

I. INTRODUCTION

This study examines a system's ability to withstand flooding and sustain less damage after a flood, while also considering flood impacts. The ability of social units to mitigate dangers is known as resilience. Resilience is a system, community, or society's ability to withstand potential hazards.

Flooding occurs as a result of heavy rains, overflowing rivers, and storms. The major goal of this article is to present realistic and easy-to-implement techniques for reducing the impact of building design in low or residual flood risk areas. Through the collection and analysis of existing practise, the study will focus on the interaction between building fabric and flood. Flood resilience solutions aim to lessen the effects of flooding. Flooding is becoming an increasingly common occurrence that affects communities all around the world. Architects suggest flood-resistant solutions based on current urban planning and landscape

design techniques, which challenge the exclusive use of hard- infrastructure projects and urge the creation of urban settings that "make room for the water."

This study flood-resistant housing in order to meet the demand for new development that is environmentally friendly and does not deplete natural resources. It will also assist in raising public awareness.

METHODOLOGY

Secondary data was gathered from a variety of government and private institutions in order to better understand the flood condition and the numerous aspects that affect building forms.

The search for new flood-resilient techniques. The results will be included in the final product, which will be community housing for the people. The research will also concentrate on the materials and specifics.

Further, to investigate potential ways for surviving floods by combining new materials, as well as to develop a design for a community dwelling prototype.

WHAT CAUSES FLOOD?

- Flooding is primarily caused by heavy rains.
- Excessive rainfall in river catchments, resulting in tributary runoff and river carrying
- flows that are greater than their capacity.
- At the confluence of tributaries with the main river, there is a back-up of water.
- A vegetation filled lake might result in flooding and a clogged natural drainage system.
- There is little to stop water from rushing off and overflowing river banks when there is a dearth of vegetation.

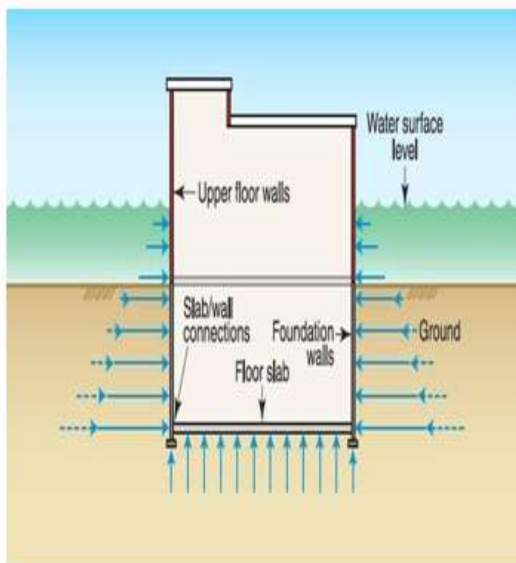
What Does 'Flood Resistant Building' Mean?

- Any building product capable of withstanding direct and sustained contact with floodwater

without severe damage is considered flood resistant.

- Flood resilience is defined as long-term solutions that can be included into building fixtures to lessen the impact of flooding on the property.
 - This means that the structure and materials of the building are meant to survive the structural and material damage caused by flood water, and that it is built to be readily cleaned and dried to eliminate pollutants and moisture, allowing it to be reoccupied. As a result, three important aspects are required.
1. Fluid and hydrostatic forces have no effect on structural integrity.
 2. Saturation resistance of the material
 3. Pathways for drainage and ventilation

II. FLOOD RESILIENT BUILDING TECHNIQUES



DRY FLOOD PROOFING

- Dry floodproofing refers to a variety of ways for protecting a building's exterior from flood waters. Keeping water light out of the structure. the method of adaption for keeping water out of the structure This is primarily a solution for non-residential structures.
- It is not a suggested method for single-family homes or other residential structures, but it may be possible in mixed-use structures.
- Coatings made of cement and asphalt are useful, but they can radically alter the appearance of a home and are subject to puncture.

- Water can be kept out of a property by using heavy plastic sheeting or a waterproof membrane along the outer wall. Make advantage of structures.
- Building walls, structural joints, and utility line apertures can all benefit from waterproof sealants.
- Applying a waterproof veneer to the outside surface of an existing structure, such as a layer of brick supported by a waterproof membrane, is a dry floodproofing measure.

WET FLOOD PROOFING

- If flood duration is of 1 day it is not responsible approaches to protecting structure for long period of wet.
- Water resilient building materials are applied that can be easily repaired or replaced.
- Wet flood proofing most suitable for shallow flooding that inundates uninhabited.
- If there is risk of flooding and cannot elevate home or build reliable flood barriers, wet floodproofing of non-living spaces is used.
- Successful wet proofing involves ensuring that floodwaters inside the home rise and fall at the same rate as floodwaters outside the home.
- wet flood proofing allows water into enclosed area of house.
- Flood vents allow water into the structure, equalizing interior and exterior pressures to avoid structural damage.

MATERIAL

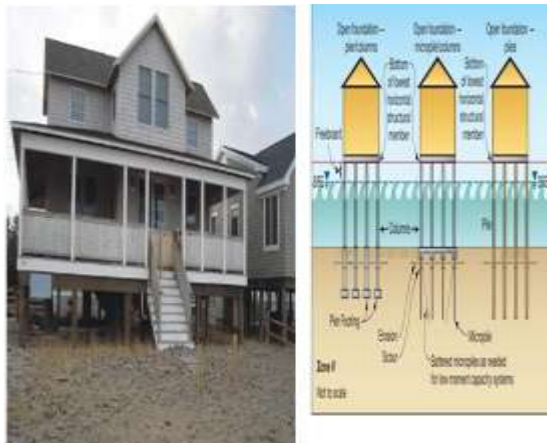
- Brick face and concrete blocks are structural walls used in wet flood proofing.
- Pressure treated plywood and non-paper facing gypsum board are used for the ceiling.
- Concrete and naturally decay-treated lumber are utilised as structural flooring materials in wet flood protection.
- Clay tiles, terrazzo tile, vinyl tile, or sheet flooring are examples of finish flooring materials.
- Wet flood proofing does not allow the use of wood cabinets and doors, wall coverings, non-toxic paints, or wood floors.

ELEVATING STRUCTURES

- Elevate the entire structure above the flood level.
- The risk of inundation is reduced by elevating structures built in flood-prone areas.
- The structure is lifted with hydraulic jacks and set on a new or enlarged base after being

detached from its foundation.

- Existing structures that are at risk of coastal flooding or erosion can typically be relocated.
- Masonry structures are more difficult and expensive to raise than lighter wood-frame structures.
- Raising a building onto piers, columns, or piles and allowing water to flow beneath it is the process of elevating it on an open foundation.
- The type of foundation is determined by the flood and site conditions.
- Infrastructure connections must be protected from flooding.



ELEVATING STRUCTURE
ELEVATING

FLOATING STRUCTURE

- Built on a body of water, a floating structure is a buoyant construction that floats.
- Stiffened plate panels are commonly used to make floating constructions.
- The pontoon principle, where one creates a stable platform that is lighter than water and the other.
- In comparison to the hollow concrete box, it is used in shallow water.
- In the event of a large flood, these homes are free to migrate.

AMPHIBIOUS STRUCTURE

- In the event of a flood, a "amphibious house" is a construction that stands on the ground yet rises up.
- It is supported by the water and floats on its dock.
- combining components from many sources to the construction and maritime industries a well-

thought-out flood-prevention approach The house's foundation is in the ground as well as the home's foundation.

- The floating base is practically undetectable from the outside. Long-term flood protection is provided through amphibious architecture.
- a method for allowing a conventional building to float on top rather than getting swamped, because of rising floodwaters
- A buoyant foundation is an amphibious foundation that allows an existing structure to float as high as it situations needs to during floods while remaining on the ground in other

III. FLOOD DAMAGE RESISTENT MATERIAL

Flood-Resilient Design and Construction Techniques. The term "flood-resistant" refers to building materials that can withstand flooding .can withstand direct contact with flood waters for at least 72 hours without suffering significant harm .Any harm that requires more than a low-cost repair. "Significant damage" is defined as "cosmetic repair." Materials that are resistant to flood damage should be used .for a building's walls, floors, and other structural elements seen in the picture, are below the base flood elevation

- Flooring Materials**
- concrete, concrete tile, and pre-cast concrete
- latex or bituminous, ceramic, clay, terrazzo, vinyl, and rubber sheets and tiles
- pressure-treated or decay resistant lumber
- pressure treated wood and cold-formed steel
- Wall and Ceiling Materials**
- brick, metal, concrete, concrete block, porcelain, slate, glass block, stone, and ceramic and clay tile
- cement board, cold-formed steel, and reinforced concrete
- polyester epoxy paint
- PT and decay resistant lumber
- PT and marine grade plywood
- foam and closed-cell insulation
- OTHER**
- Doors made of hollow metal,
- cabinets made of foam or closed-cell insulation.
- (with waterproof mortar) Glazed brick
- concrete,
- concrete block,
- glass block,
- stone Formed-in-place polyurethane flooring

- Insulation might be sprayed polyurethane foam or closed-cell plastic foam.
- Adhesive that is resistant to water.

IV. SUGGESTIONS FOR MATERIAL SELECTION

- When using flood-resistant materials, keep the following points in mind:
- Even if you employ flood-resistant materials, keep in mind that your construction will be harmed as long as it is exposed to flooding.
- Cleaning and cosmetic repair will almost always be required.
- Although flood damage resistant materials can lessen the amount and severity of water damage, they cannot protect your structures against additional flood threats, such as flood borne debris.
- In places below the flood level, all hardware should be composed of stainless or galvanized steel.

V. CONCLUSION

- The goal of this study is to develop realistic and easy-to-implement techniques for the design and specification of new structures in low or residual flood risk locations in order to mitigate flood damage.
- This study sheds light on the evolution of a housing neighbourhood by adding several current flood resistant elements.
- We may learn about building and site scale strategies for flood resilience structures in this lecture. This way of planning through resilient measures results in a forward-thinking physical conscious system that integrates flood hazards.
- potential flood resilient architecture research could help to fill in the gaps in the flood risk aspects. More robust awareness and experimentation would result from research into new technology
- By bringing together interdisciplinary researchers, practitioners, experts, working in the water and flood sector to create scalable solutions for accelerating the effect of such resilient technologies with a better knowledge of how they work.

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IMAGE SOURCE

- FEMA P-936 Flood proofing Non-Residential Buildings
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