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The Frog: Building that Triumph the Flood

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Abstract:

Floods are most destructive in nature and cause lot of damage to the infrastructure and devastation to the human lives as well as to the forest. India is very much affected by the floods and 40 mha areas out of 329 mha is flood prone area. In the past three decades India got struck by 481 natural disasters and out of them 184 were flood disasters that affected the millions of lives and took over many lives. Due to enhancement in the encroachment of flood plains the frequency and the intensity of flood is increasing in India over the years. Number of death due to the flood disasters is decreasing from the past years due to the safety precautions by the government but the economic loss is increasing gradually. According to the many scientist and flood expert including the environmental agency of India NDMA depicted that due to the climatic change in India and urban development may increase the flood frequency. Keeping the above points into consideration we have come acquired with a solution of special house which mitigate the problem of floods and try to compensate the problem to minimum level.

Keywords:

Flood houses; NDMA; flood safety; frog houses; new foundation type

1. Introduction

To overcome flood problem traditional flood resisting house and floating house were innovated, this was the great initiative for minimize the problem from flood. During flood it wasn't stand true 100% on formulation it is going to move with water and leave there first place. During flood water exert horizontal force and house with foundation start to move with water.

After research of floating house, a frog house is very light weight with timber framed structure and having light weight concrete foundation which gives strength and stability to house. The frog house built on excavated wet dock securing the stability on vertical post. In this frog house there is only vertical movement, there is no horizontal movement like traditional floating house because horizontal movement is resist by vertical posts. This frog houses majorly have three parts-

1. Buoyant foundation
2. vertical post
3. Timber framed superstructure.

The buoyant foundation is the technology that enables the frog house to rise during flood water and back to the initial position safely. The strategy of this project is to deal with destructive flood water and change in position of house with water level.

The vertical post, which restrict the horizontal movement are constructed from the sheet piling with mash base are the mean of vertical guidance. This vertical post allows the house for their vertical movement according to the level of water.

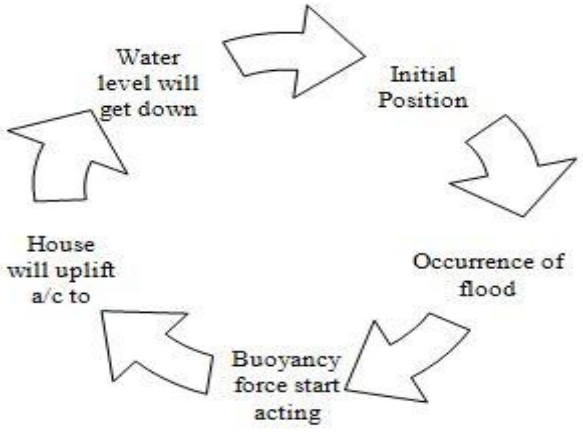
2. Benefits

1. Environment friendly
2. Lifting up along with foundation
3. Good load bearing capacity
4. The foundation of the house is made up of waste material such as fly ash and rice husk.

3. Disadvantages

1. The major disadvantage is that we cannot construct concrete superstructure because it is too heavy and it resist the foundation to rise up.
2. Multi-storey buildings can't be made.
3. It can't be constructed on more elevated place.

4. Flow Chart



ISSN: 2278-4632
Vol-10 Issue-5 No. 10 May 2020

5. Model Description

The methodology of the frog house is totally based on the concept of buoyancy force in which the density of the foundation should be less than the density of water to rise up at the time of flood disaster. The strength and its design will be depends upon the dead and live load of the structure as well as to the requirement of the occupants. The designing phase is not described in this work. The superstructure is made up of wooden or lightweight material to the overall weight of structure on foundation. The frog house consists of a 2 BHK individual block. The various observations was as follows-

Weight of the Model: - 2kg
Density of the model: - 0.7gm/cm^3

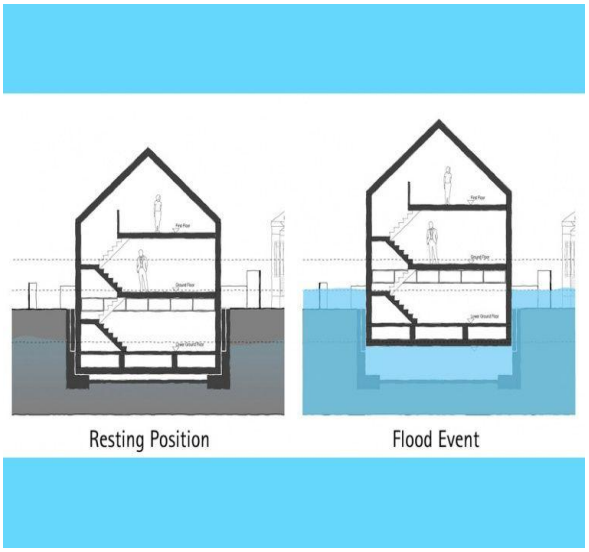


Figure-1 Sketch describing the model.

6. Materials Used

1. Rice Husk Ash
2. Fly Ash
3. Foaming Agent
4. OPC-53 Grade

The ingredients or materials that are being used in the construction of this house are industrial waste and agricultural waste. The fly ash is the carcinogenic material that is responsible for cancer if it came into contact of the people. Rice husk ash is a byproduct obtained by the controlled burning of the rice husk it increases the air pollution if it is present in the atmosphere. Foaming agent is used to develop the voids in the foundation hence it reduce the weight and decrease the density of foundation to float it on water.

Ratio of Ingredients: - (All the quantities are for 1m^3)
Foaming Agent- 1.2L for 40L of water

Table-1 different grades of cement; fly ash and rice husk ash

S. No.	Cement (gm)	Fly Ash (gm)	Rice Husk Ash (gm)
Grade A	260	780	260
Grade B	310	620	310
Grade C	435	435	235

7. Results

In order to determine the strength of the buoyant foundation the blocks were constructed of the material (as mentioned above) in the ration of 1:1:3 various test were done as per the IS code and obtained results are as follows:-

7.1. Compressive Strength Test

The cubic sample were made and tested on compressive strength Machine and the results of test are given in Table-2.

Table-2 Compressive strength test results

S. No.	Sample	Load (KN)	Compressive Strength (N/mm^2)	Avg. Compressive Strength (N/mm^2)
Grade A	S1	81.7	3.65	3.99
	S2	91.6	4.08	
	S3	93.3	4.15	
	S4	92.1	4.07	
	S5	72.6	3.20	
	S6	88.6	3.95	
	S7	96.3	4.27	
	S8	95.8	4.24	
Grade B	S1	81.6	3.61	3.62
	S2	77.1	3.41	
	S3	85.3	3.77	
	S4	80.6	3.54	
	S5	79.4	3.53	
	S6	87.9	3.92	
	S7	83.6	3.72	
	S8	76.5	3.41	
Grade C	S1	41.1	1.83	1.91
	S2	48.4	2.16	
	S3	39.6	1.75	
	S4	46.6	2.08	
	S5	37.9	1.69	
	S6	45.9	2.05	
	S7	42.6	1.88	
	S8	40.1	1.77	

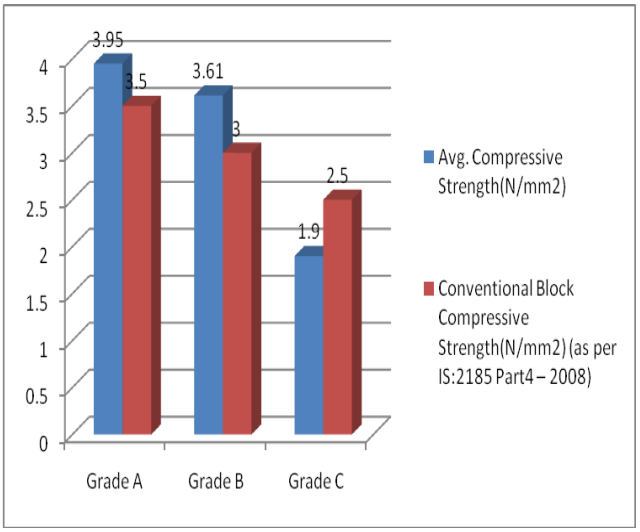


Figure-1 Comparing average experimental value and

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Vol-10 Issue-5 No. 10 May 2020

standard values of compression test results

7.2. Water absorption test

The cubes were made and tested and the test results of the water absorption test are given in Table-2.

Table-2 Water absorption test results

S.No.	Dry Weight (Kg)	Wet weight (Kg)	Water absorption	Avg. water absorption
Grade A	9.46	10.12	7.41	7.5
	9.21	9.81	7.10	
	8.96	9.65	8.27	
Grade B	9.16	9.85	7.6	8.7
	8.76	9.68	10.5	
	8.82	9.51	8.10	
Grade C	8.16	9.05	9.95	11.2
	7.71	8.61	11.8	
	7.81	8.77	11.71	

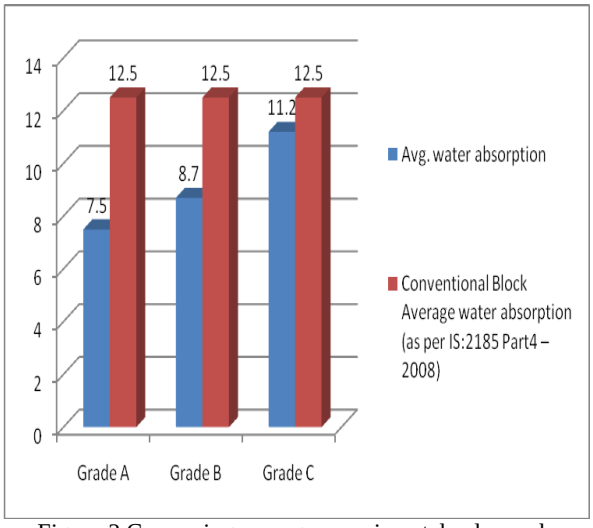

Figure-2 Comparing average experimental value and standard values of compression test results

7.3. Density test

The cubic sample were made and tested and results are given in Table-3

Table-3 Dry Density test results

S.No.	Mass of block (kg)	Volume of block (m^3)	Dry Density (Kg/m^3)	Dry Density (Kg/m^3)
Grade A	8.64	0.009	961.12	1000
	9.10		1011.12	
	9.40		1044.41	
Grade B	8.81	0.009	977.76	900
	8.75		972.76	
	8.81		977.77	
Grade C	7.30	0.009	811.12	800
	8.05		894.44	
	6.00		766.67	

8. Conclusions

1. Reduce casualties due to Flood disasters.
2. Minimize the destruction to property.
3. Minimize the disturbance in economy of the country.

9. References

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