International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 06 | June 2019 www.irjet.net p-ISSN: 2395-0072

ANALYSIS OF FLOOD RESISTANT REHAB SHELTER

Rasim Navas[1], Thalhath A R[2], Muhammed Faiz[3], Uvaise Ebrahim[4]

[1]Assistant Professor, Dept. of Civil Engineering, Ilahia College of Engineering and Technology, Kerala, India
[2-4]B-Tech Student, Dept. of Civil Engineering, Ilahia College of Engineering and Technology, Kerala, India

---

Abstract - ***An initiative design and analysis for fast rehousing of people who lost houses during Flood. Efficient flood preparation is the need of the time to minimize the damage in flood prone area. Flood resistant design involves sustainable development, economically feasible, environmental-friendly and socially approved. Sustainable development in the field of flood hazard mitigation is required. Floods are the sources of large scale destruction from the early stages of civilization. Rising rate of population and consequent urbanization leads to deforestation and a high percentage of the paved surface which blocks the infiltration of water in case of precipitation. Lesser infiltration leads to high runoff resulting in rapid and increased hydrograph peak. In India, more than 40 Million Hectare of the total 329 Million Hectare geographical area is flood prone. During last three decades, other than heavy financial losses, millions of people were affected and about 4000 people lost their life due to the flood disaster in India. Increase in the frequency, spatial extent, duration, intensity and timing of extreme weather condition is expected due to climate change. Flood is a natural process which cannot be ceased to occur; thus efficient flood preparation is the need of the time to minimize the damage in flood-prone areas. Sustainable development involves safe, economically feasible, environment-friendly and socially approved growth. Sustainable development in the field of flood hazard mitigation is required. In this paper, an effort is made to discuss the concept of flood resistant residential house and the new techniques developed and used in different parts of the world.***

Key Words: Flood, Sustainable, home, Rehab shelter.

1. INTRODUCTION

Flood can be defined as the condition in which that land is submerged in water which is normally used to be dry. It can be attributed to an unusual high stage of a river or other water bodies like lakes, oceans etc. during which the water spills over the bank and spread to the adjoining land. The low-lying area adjacent to a river bank is called flood plain, which is for med mainly of the sediments of river and consists of a very fertile soil. In the case of flood the water spills to the flood plains which are thickly populated due to the advantages of good water availability and fertility of the land for irrigation purposes. The flood condition can occur due to various reasons depending upon the location of the concerned area and the primary cause of the accumulation of water which cannot be accommodated naturally. For a flat or low-lying land with infiltration or runoff rate lesser than the rate of precipitation, water can accumulate resulting in a flood situation. Due to different natural phenomena like rainfall lasting for a longer period of time, monsoon season, tropical cyclones or a large amount of rapid snowmelt flood situation can occur in rivers or other drainage.

2. METHODOLOGY

Irjet Template sample paragraph .Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

2.1 Project specification

The basic specification includes,

- A residential building in built up area of 560 sq.feet:
- Foundation: 2m deep concrete foundation.
- Column: Square MS tubes
- Wall: Sandwiched cement fibre board in steel frame.
- Floor: Cement fibre board.
- Roof: GI truss with Manglore tiles.
- It includes basic electrical and plumping works.

2.2 Design specialties

It is a rapid construction technique. It requires only 15 to 20 days for construction. It is also a cost effective design. The design is for a permanent house as it is durable as normal house. The design considered as a Growing house: design allows easy future expansion. The Elevated floor (above flood level) provides house can function until water raises the flood level. It is also a sustainable design. The strength will not affect even if the house is flooded up to one month.

3. SITE INVESTIGATION

For our proposed project idea we required a site that comes under flood affected areas. Thus we visited some sites at Muvattupuzha and Kothmangalam municipalities. We found a suitable site at keecheripady, muvattupuzha which comes under muvattupuzha municipality. For the design we are in need of the maximum flood level. For this we take Kerala flood 2018 as reference. After the local investigation and

surveys conducted we came to conclusion the selected site is affected upto a height of 1.3 m from the ground.

For the preparation of site plan we investigated the nearby properties and structures. There is secondary school nearby the proposed site. The access to the property is from the municipality road connecting oneway junction and attayam road. We collected the boundry measurements of the site. The site is in shape of trapezoidal. Thus with the collected information we started the site plan drawing in Autocadd.

4. PLAN FOR THE BUILDING

The proposed building is a rehab shelter which has to be constructed with in a short time as much as possible. Thus we have constrained on area of the building. So we adopted a plan that includes a common living and dining room, two bedrooms with attached toilet and a kitchen. The building is elevated from ground to a height of 1.5m. We have two openings for the building; one from the kitchen and the other from the living room. Stairs are used for the entry to building. The building is planned to make it comfortable, economical and to meet all the requirements. The attempt of the planners should be attained maximum convenience with the limited money available, functional utility, cost, habitat requirements etc. Circulation area should be minimum possible without effecting other requirements and convenience. . The spacing of the building with respective to the geographical direction, the direction of wind and the altitude and the azimuth of the sun is known as the entire orientation is fixed by also considering the frontage of the building. To start with all these requirements should be known collected there by and then all planning should be taken up. The plan drawings are prepared by the autocadd software 2014.

Fig -1: Plan for the proposed building.

5. ANALYSIS OF THE BUILDING.

We have done the analysis and design of the proposed building using Staad pro. STAAD.Pro is widely used for structural analysis and design. The STAAD.Pro software consists of the following.

- STAAD.Pro Graphical User Interface (GUI)
- STAAD analysis and design engine
- STAAD post-processor

Graphical User Interface is used to generate the model, which can then be analyzed using the STAAD engine .After analysis and design is completed, the GUI can also be used to view the results graphically.

STAAD analysis and design engine is a general purpose calculation engine for structural analysis and integrated steel, concrete, timber and aluminum design. Analysis is done by matrix method.

The post –processing mode is used to verify the analysis and design results and generate reports. Extensive result verification and visualization facilities are accessed from the post-processing mode.

STAAD.Pro features a state of the art user interface, visualization tools, powerful analysis and engines with advanced finite result verification. STAAD.pro is the professional's choice for the analysis and design.

5.1 Structural Analysis.

Structural analysis, which is an integral part of any engineering project, is the process of predicting the performance of a given structure under a prescribed loading condition. The performance characteristics usually of interest in structural design are:

1. Stress or stress resultant (axial forces, shears and bending moments)
2. Deflections
3. Support reactions

Thus the analysis of a structure typically involves the determination of these quantities caused by the given loads and/or the external effects. Since the building frame is three dimensional frames i.e. a space frame, manual analysis is tedious and time consuming. Hence the structure is analyzed with STAAD Pro. In order to analyze in STAAD.Pro, We have to first generate the model geometry, specify member properties, specify geometric constants and specify supports and loads.

5.2 Commands and input directions.

The user utilizes a command language format to communicate instruction to the program. Each of these commands either supplies to the program or instructs it to perform some calculations using the data already specified. The input file can be treated through a text editor or modeling facility. The commands should be entered in a sequential order or otherwise it will indicate syntax error. All

input data provided is stored to the program. Data can be added, deleted or modified within an existing data file.

5.3 SEQUENCE OF COMMANDS

- Specify the type of structure
- Units specification
- Joint coordinate specification
- Member incidence specification
- Member property specification
- Constants specification
- Support specification
- Loading specification
- Load combination specification
- Analysis specification
- Print specification
- Design specification
- End run specification

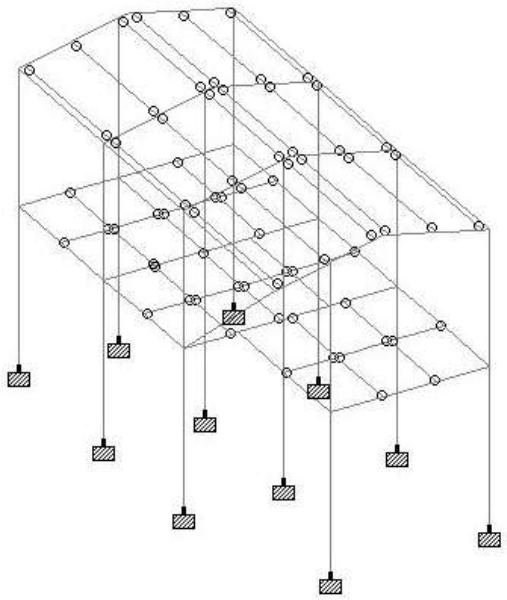

Fig -2: Supports of the structure

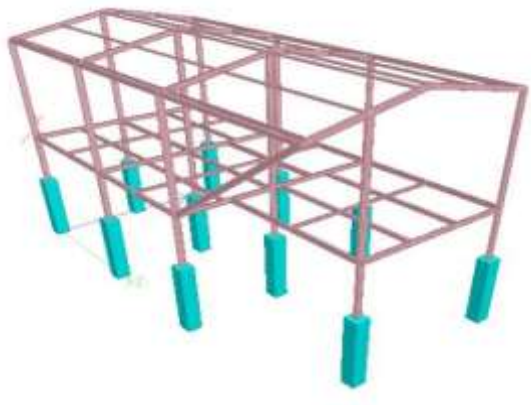

Fig -3: 3D model of the structure from staad.

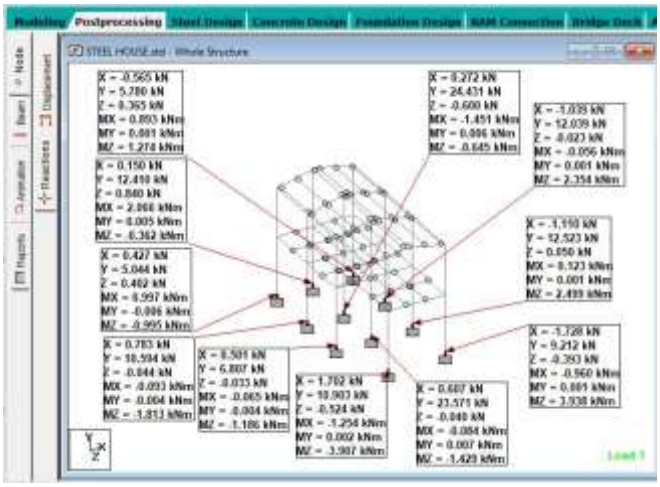

Fig -4: Support reactions

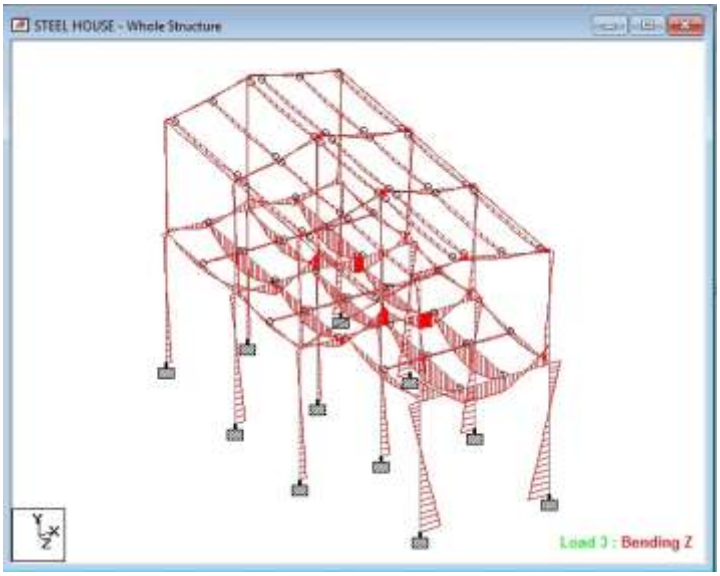

Fig -5: Bending diagram

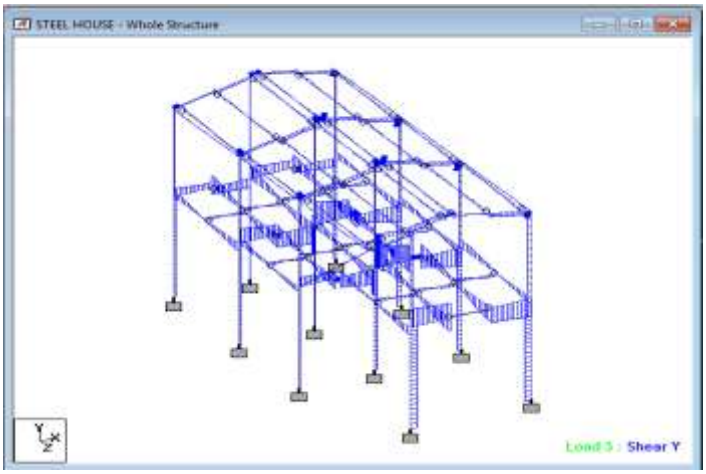

Fig -6: Shear force diagram.

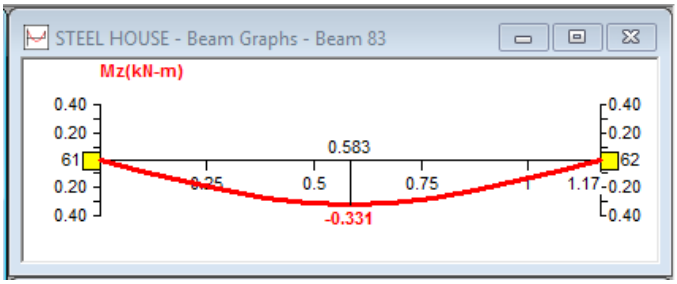

Fig -7: Maximum bending on beam.

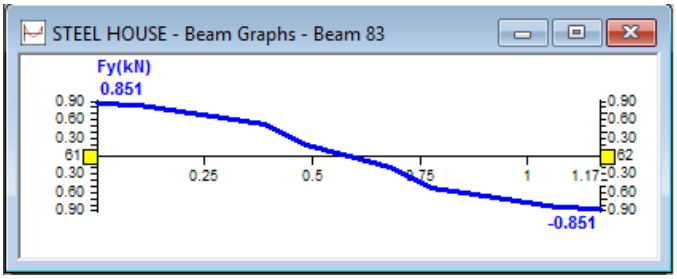

Fig -8: Maximum shear force on beam.

6. CONCLUSIONS

In this study within some experimental work it has been observed that when planning, analyzing a Flood resistant buildings as rehab shelter, the conclusions obtained are

- A lot of work is going on for flood resistant houses in different parts of the world. Among varies techniques we employ elevated home concept for resisting the flood.
- The planning of the building is done to make it comfortable, economical and to meet all the requirements. The attempt is to attain maximum convenience with the limited money available, functional utility, cost, habitat requirements etc.
- The result from analysis ensures that the structure is safe and economical against all possible loading conditions and to fulfill the function for which they have built.

REFERENCES

[1] Mohammad Kamil Khan and Subhan Ahmad (2017). Flood Resistant Buildings: a Requirement for Sustainable Development in Flood Prone Areas. International Journal on Emerging Technologies 8(1): 114-116(2017.

[2] Ahmad S, Khan MK and Saqib M (2016). Flood Resistant Houses. Journal of Construction Engineering, Technology & Management; 6(3): 54–56.

[3] Pradeep V , Papa Rao G (2014). Comparative Study of Pre Engineered and Conventional Industrial Building. International Journal of Engineering Trends and Technology (IJETT) – Volume 9 Number 1.

[4] Teklu T. Hailegeorgis , Knut Alfredsen (2016). Regional flood frequency analysis and prediction in ungauged basins including estimation of major uncertainties for mid-Norway. Journal of Hydrology: Regional Studies 9 (2017) 104–126.

[5] Dheekshith K, Suraj, Vijayakumar G Shet, Preejesh P P, Yarhok Myrphet (2018), Analysis and evaluation of a commercial & residential building (g+5) by using staad.pro. International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 06 June 2018