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SEISMIC ANALYSIS OF G+5 BUILDING WITH AAC BLOCKS AND CONVENTIONAL BLOCKS FOR DIFFERENT ZONES BY USING STAAD PRO

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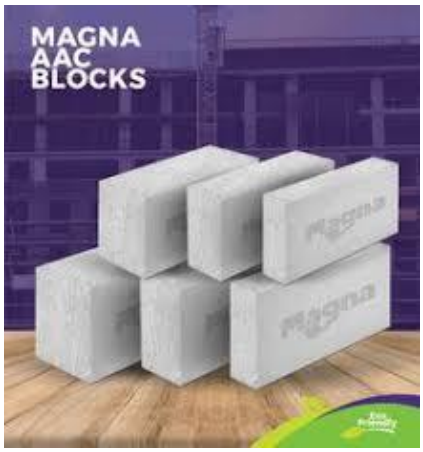
Abstract: In order to compete in the ever growing competent market it is very important for a structural engineer to save time. As a sequel to this an attempt is made to analyze and design a multistoried building by using a software package STADD PRO. As STAAD Pro is the current leading design software in the market, many structural designing companies use this software for their project design purposes. So, this article mainly deals with the analysis of the results obtained from the design of a building structure when it is designed using STAAD Pro Software. The software method of analysis is used for a G+5 Residential building with ACC blocks and conventional bricks, located in Zone-II and zone V. In this study two types of infill material used first is brick infill, second is AAC block infill. So there for two types of infill material in which 6 models will be prepared in STAAD Pro. In this study G+5 storey building is considered for analysis which is located in zone IV earth quake region and zone II. Static analysis is done using staad pro software, soil conditions is to be medium and importance factor is to be taken as 1.2. various parameter studied like lateral displacement of building axial load in column, storey drift, storey shear, base shear, moments diagrams for a particular beam for all two types of material and for all cases and weight calculations as per code IS 1893:2002.

Index Terms **–AAC Blocks, Conventional Bricks, STAAD PRO**

I. INTRODUCTION

Bricks remain one of the most important building materials in the country. Brick making is a traditional industry in India, generally confined to rural areas. It has directly or indirectly caused a series of environmental and health problems. At a local level, in the vicinity of a brick kiln, environmental pollution from brick-making operations is injurious to human health, animals and plant life. The environmental pollution from brick making operations contributes to the phenomena of global warming and climate change. Extreme weather may cause degradation of the brick surface due to frost damage. Various types of blocks can be used as an alternative to the red bricks, to reduce environmental pollution and global warming. Aerated Concrete blocks (AC) may be one of the solutions for brick replacement. AC is one of the eco – friendly product. AC is porous, non-toxic, reusable, renewable and recyclable. Aerated Concrete, also known as aircrete, is a lightweight, load-bearing, high insulating, durable building product, which is produced in a wide range of sizes and strengths. AC is produced out of a mix of quartz sand or pulverized fly ash, lime, cement, gypsum/anhydrite, water and aluminum and is hardened by steam-curing in autoclaves. Being aerated, it contains 50 - 60 % of air, leading to lightweight and low thermal conductivity. AC is a lightweight, precast building material that simultaneously provide fire resistance, construction, economy and speed. Brick is the most commonly used building material in construction. AAC blocks are new construction material. 3 times lighter than traditional brick (clay brick);it means it covers more area in same weight as clay brick gives in one bricks. In this paper; attempt has been made to replace the clay brick with light weight AAC blocks. The usage of AAC block reduces the cost of construction up-to 25% as reduction of dead load of wall on beam makes it comparatively lighter members. The use of AAC block
Also reduces the requirement of materials such as cement and sand up-to 55%.



II. OBJECTIVES OF STUDY

- The objective of this project is to study the effect of ACC block and Convectional Brick on the seismic behaviour of the building.
- To study various effects of ACC and Conventional bricks in the structures various parameters such as lateral displacement, storey drift, base shear etc. are studied.
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- To Compare the Staad pro results for the following parameters such as base shear, storey drift, Maximum bending moment and mode shape etc.

III. LITERATURE REVIEW

Supratik Bose(2014) Conventional infill materials significantly influence the overall response of framed structures due to their higher strength and stiffness. Recently, autoclaved aerated concrete (AAC) blocks have been widely used all over the world as a potential infill material and its application in upper stories of open-ground-story (OGS) frames can be beneficial. However, limited experimental work has been performed on AAC in filled RC frame and hence, a reduced scale model of a RC prototype frame was constructed in the laboratory to evaluate its performance under lateral loading. The average values of unit compressive strength and elastic modulus of AAC masonry was observed to be approximately one-third and one-half of that of conventional masonry, respectively. The AAC in filled RC frame was subjected to displacement controlled slow-cyclic test to study its hysteretic response. The low strength and stiffness of AAC infill results in improved load sharing between infill and frame, which help to develop yield mechanism in the frame earlier for better energy dissipation. The performance of AAC in filled RC frames is evaluated by non-linear static and dynamic analysis based on the FEMA P695 methodology. Incremental dynamic analysis (IDA) of OGS prototype frame in filled with AAC blocks and conventional masonry was performed to calculate their probability of collapse at maximum credible earthquake (MCE). It was observed that AAC in filled RC frame designed with response reduction factor of 5 has lower probability of collapse at MCE compared to conventional infills.Thus, the AAC infill improves the seismic behaviour of OGS-RC frame due to its lower strength and stiffness.

Rajat Srivastava(2018) Today, tall structures have turned out to be overall engineering wonder. From past earthquakes, it is demonstrated that a significant number of structure are absolutely/somewhat harmed because of earthquake and now-adaysit has turned out to be important to decide seismic reactions over such structures. Structural analysis is a branch which includes in the assurance of structures with a specific end goal to foresee the reactions of genuine structures, for example, structures, spans, trusses and so on. Basic outlining requires basic investigation and seismic examination of any structure before development. All together satisfy the prerequisite of this expanded populace in the constrained territory; the stature of building has turned out to be medium to tall structure. In this way, to guarantee wellbeing against seismic powers of multi-storied working, there is need of seismic examination study and planning quake protection structures. Amid earthquake, disappointment of structure begins from the purposes of a shortcoming. By and large, shortcoming happens because of geometry, mass brokenness and solidness of structure. That is the reason; structures fizzle amid earthquakes generally, because of vertical abnormality. The principle target this thesis is to think about the seismic investigation of structure for static and dynamic examination in standard minute opposing casing.

3)Farid ABED(2017) Autoclaved aerated concrete (AAC) is an environmentally friendly material that has several advantages such as heat insulation, sound insulation, and light weight which reduce the energy consumption of a structure during its construction and when using it. However, the compressive strength of AAC is relatively low in comparison with concrete masonry units that are used as building blocks. This paper provides insight into a newly proposed AAC-concrete sandwich composite. The main aim of this research is to produce a lightweight eco-friendly load bearing building block. Construction and demolition wastes including the cement and fine powder waste were utilized to generate the AAC-concrete composite.

4) **Omprakash Netula(2017)**In this study 15 storey building is considered for analysis which is located in zone 4 earth quake region. Static analysis is done using ETABS software, soil conditions is to be medium and importance factor is to be taken as 1.2. various parameter studied like lateral displacement of building axial load in column, storey drift, storey shear, base shear, moments diagrams for a particular beam for all three types of material and for all four cases. Results are represented in graphical as well as in tabular form. The structural members are modeled with the ETABS software package. Rigid end conditions are assumed for the frame members and the floor slab is assumed to act as diaphragms which ensure integral.

5.alexandre a. costa(2011) The experimental results are summarized in the article and the derived essential seismic design parameters are presented. The test results allowed the calibration of a macro-element model representative of the nonlinear response of single piers, simulating their cyclic experimental behavior. Three-dimensional models of unreinforced AAC masonry buildings were then obtained using the TREMURI program. Their seismic performance assessment has been carried out through both a nonlinear static (pushover) procedure and nonlinear dynamic time history analyses. Nevertheless, the obtained results allow for some preliminary considerations on the global response of this type of construction and its potential for application in moderate and high seismicity countries.

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IV. RESEARCH METHODOLOGY

- Study various literatures related to codal comparison of structure.
- Selection of structure and modelling in STADD-PRO.
- Modelling of two structures in STADD PRO according to IS1893:2002.
- Design of structure as per required IS code.
- Comparison of results for both the models will done to check the effect on seismic response of structure.

V. SCOPE OF THE STUDY

- The present study focused on the seismic response of reinforced concrete structure of G+5storey.
- Two models of five stories frames will be modelled as per IS1893:2002 in STADD PRO.

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