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## ENVIRONMENTAL APPLICATION OF BIOCHAR FROM RICE STRAW AND PLASTIC COMPOSITE AS A PARTIAL REPLACEMENT OF CEMENT IN CONCRETE

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#### **ABSTRACT:**

- 1. Structural design is a science of art of understanding the behaviour of members of structures when loads are subjected to them designing these members with elegance and economy to give a serviceable safe and durable structure.[1,2,3] The entire process of structural planning and design requires not only imagination and conceptual thinking but also sound knowledge of practical aspects, such as recent design codes and bye-laws, backed up by ample experience, institution and judgement.
- 2. The process of design of the structure, primarily to functional requirements, initially, the requirements proposed by the client are taken into consideration. [4,5]They may be vague, ambiguous, or even unacceptable from engineering point of view because he/she is not aware of the various implications involved in the process of planning and design, and about the limitations and intricacies of the structural science.

#### **1. INTRODUCTION**

The basic needs of human existence are food, clothing & shelter. From times immemorial man has been making efforts in improving their standard of living.[6,7,8,9] The point of his efforts has been to provide economic and efficient shelter.[10,11,12] The possession of shelter besides being a basic, used, gives a feeling of security, responsibility and shown the social status of man.

Every human being has an inherent liking for a peaceful environment needed for his pleasant living, this object is achieved by having a place of living situated at the safe and convenient location, such a plane for comfortable and pleasant living requires considered and kept in view.[13,14,15]

- A peaceful environment.
- Safety from all natural source & climate conditions

A building is a structure with a roof and walls standing more or less permanently in onplace. [16,17,18]Buildings come in a variety of sizes, shapes and functions, and have been adapted throughout history for a wide number of factors, from building materials available, to weather

conditions, to land prices, ground conditions, specific uses and aesthetic reasonsA building plan is simply a graphical representation of a building and its different elements. It contains different types of plans of a building such as site plan, floor plan, structural plan, cross-sections, elevations, electrical detailing, plumbing, and landscape drawings. [19,20,21]A survey may indicate terrain and other conditions that will strongly influence the design decision. Limitations imposed by difficult terrain, in addition to those imposed by local laws or ordinates may limit such items as drive ways and parking entrances. [22,23,24,25]The process of designing a Soft Storied Residential Building involves :For this project water samples are collected from the different locations of the reservoir.

# **2. SOFTWARES USED**

# STAAD.RRO:

STAAD.Pro is widely used software for structural analysis & design from Research Engineers International in Yorba Linda, CA.

- > It is a Structural Analysis & Design Program Software.
- > Widely used for 3D model generation, analysis & multi-material design
- STAAD performs the analysis and design of different types of structures such as trusses, plane and space.
- STAAD also has ability to perform design of members following more than 20 international building codes Includes:
- 1) Visualization tools

2) Seamless integration

- ➢ Fast and gives accurate results.
- > Accurate and quick in production of plans for massive construction.
- Reduces cost and saves labor.

The STAAD engine: It is a general–purpose calculation engine for structural analysis & integrated steel, concrete, timber & aluminum. [26,27,28] This is a package which consists of several modules for very specific structural engineering tasks such as analysis and design of base plate, footing, cantilevers, retaining walls, bolt groups, pile groups, one way & two way slabs etc.

- STAAD.Pro has an intuitive, user-friendly GUI, visualization tools, powerful analysis and design facilities and seamless integration to several other modeling and design software products.[29,30,31] The software is fully compatible with all Windows operating systems but is optimized for Window-XP.
- For static or dynamic analysis of bridges, containment structures, embedded structures (tunnels and culverts), pipe racks, steel, concrete, aluminum or timber buildings, transmission towers, stadiums or any other simple or complex structure, STAAD-Pro has been the choice of design professionals around the world for their specific analysis needs. [32,33,34,35]STAAD.Pro is a general purpose program for performing the analysis and design of a wide variety of types of structures. The basic three activities which are to be carried out to achieve that goal are
- 1. Model generation
- 2. The calculations to obtain the analytical result

3. Result verification - are all facilitated by tools contained in the program's graphical Environment. The STAAD.Pro model is prepared to the scale in its working space. [36,37,38]The frame structure model is generated which consists of beams and columns, and then the material, with their cross-section properties, are inputted to STAAD. Pro.[39,40] The loads are then assigned and after that, the structure is analyzed with the help of the STAAD

## **REVIT:**

Autodesk Revit is a building information modelling software for architects, structural engineers, MEP engineers, designers and contractors.

- The original software was developed by Charles River Software, founded in 1997, renamed Revit Technology Corporation in 2000, and acquired by Autodesk in 2002.
- > The software allows users to design a building and structure and its components in 3D, annotate the model with 2D drafting elements, and access building information from the building model's database.
- The process of Revit 3D modelling in a BIM environment enables collaboration between project stakeholders
- When a user creates a building, model, or any other kind of object in Revit, they may use Revit's rendering engine to make a more realistic image of what is otherwise a very diagrammatic model.

## METHEDOLOGY



## 4. MODEL DESCRIPTION

**Type of building** : R.C. Frame building Number of floors : G + 3 residential building Number of columns:18 Location of building : Visakhapatnam **Total height of the building** : 12m from ground level **Depth of foundation** : 1.5m below ground level Type of footing : Isolated footing **Plinth level** : 0.45m above ground level Size of beams : 0.35m x 0.50m Size of columns :0.30m x 0.45m Thickness of slab : 150mm **Type of walls :**Ordinary Clay Red Bricks Wall thickness :230mm (outer wall)& 150mm(inner wall) Type of Staircase :Dog legged Staircase Grade of concrete : M 25 Grade of Steel : Fe 415

#### **3. CONCLUSION**

The Functional Designing i.e., the Planning of the Building has been completed as per the Building Bye-laws, Regulations and Principles of planning. The Modeling, Analysis and Design of the Building frame has been completed using STAAD.Prosoftware. The Manual design of Staircase and Slabs has been completed. Analysis and Design of Foundation has been completed using STAAD Foundation software. The Estimation of various quantities of the building has been done using Revit.

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