IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DESIGN & MANUFACTURE OF POROUS CONCRETE USING SUGARCANE FIBER FOR URBAN PAVEMENTS

[1] Sreevidhya raman, [2] Harshavardhan Karanam, [3] Karthik S, [4] Ranjith Kumar S, [5] Prajwal kumar N

[1] *Assistant Professor,[2]student,[3]student, [4]student, [5]student*

[1] *Dept. of Civil Engineering*

[1] *Cambridge Institute of Technology, Bangalore, India*

Abstract: The focus of present researchers shifted towards utilizing local available alternative materials with binding properties in concrete as a cement replacement. Utilization of agricultural waste with pozzolanic properties in concrete will further aid for sustainability. Thus, the present study is initiated evaluate the mechanical of pervious concrete with sugarcane ash replacing cement. Porous concrete is gap graded concrete mix with minimum or no fine and which allow water to percolate in to the earth beneath the pavement. Porous concrete being used as structural layer in the pavement, the concrete mix shall require minimum structural strength, as well as the permeability properties. M20 concrete mix design process is adopted in the present study, with an assumption that the cement mortar just coats the aggregate and does not completely fill any voids. The dried sugar cane waste is incinerated at 250^0 C to get the sugarcane ash, which is further sieved through 150 microns sieve, and the passing fraction is used in mix as a partial replacement for cement. Concrete cubes with sugar cane ash replacing cement in ratios of 0 %, 0.5 %, 1 %, and 1.5% by weight were prepared to evaluate the 7 days, 14 days and 28 days compressive strength. The compressive strength (N/m^2) obtained for 0.5% is 112, 191, 120, 1% is 205,210,218. and 1.5% is 280,292,302 for 7, 14 and 28 days respectively.

Index Terms - Compressive Strength, Porous - Concrete, Sugarcane-Ash

I. INTRODUCTION

With the growth in population the land surface is being covered with the impervious surface in areas such as residential and commercial buildings. Due to the impervious surface the storm water is not filtered into underground surface, and the run off rapidly increases. Then the drainage system gets overloaded and flash loading became inventible. Due to the impervious surfaces, it is difficult for soil to exchange heat & moisture with air; then the humidity of earth's surface will increase which leads to greenhouse and hot land effects in the city. Therefore, the temperature and humidity of the earth surface cannot be adjusted. At the same time, the plash on the road during the rainy day reduces the safety of the traffic of the vehicle. With the ill effects of impervious concrete surfaces, the usage of pervious concrete has become inevitable. Pervious concrete is a special type of concrete mix, which contains voids in the range of 15 to 25%. The interconnected voids help water to flow into the ground easily. Various pollutants such as sediments nutrients and heavy metals are carried by the runoff resulting from impervious surface areas that directly get mixed with the surfacewater.

Pervious concrete gained wide acceptance after second world war to emphasis on conservation of nonrenewable mineral resources and energy. Due to the voids in the concrete, pervious concrete is used in construction application like the sidewalks, parking lots, and drive ways. With ever increasing demand for cement, the focus of present researchers shifted towards utilizing locally available alternative materials with binding properties in concrete as a cement replacement. Utilization of agricultural waste with pozzolanic properties in concrete will further aid for sustainability. In world-wide agriculture wasteare produced in huge quantities and they contain some interesting factors like cement binding materials, reactants to aggregates, and cement replacement material. The generation and management of waste is an issue which has vital importance for economic and environmental development in upcoming year she introduction should also discuss the state of liquefaction mitigation technique research and practice at the moment, highlighting any drawbacks or difficulties with the current approaches. This prepares the ground for GGBS columns to be presented as a viable substitute with possible benefits like affordability, environmental sustainability, and simplicity of use. Additionally, using GGBS columns to describe the goals and extent of the ground densification study or project is essential. Talking about the precise study questions, the experimental design, and the anticipated results may fall \under this category. Giving a summary of the paper's or presentation's structure also makes it easier for the audience or reader to navigate the sections that follow.

II. RELATED WORK

ABRAHAM M. WOLDEMARIAM, WALTER O. OYAWA AND SILVESTER O. ABUODHA, "CYPRESS TREE EXTRACT AS AN ECO-FRIENDLY ADMIXTURE IN CONCRETE" INTERNATIONAL JOURNAL OF CIVIL ENGINEERING & TECHNOLOGY (ICIET), VOL 5, ISSUE 6, 2014, PP. 60 - 69, ISSN PRINT: 0976 - 6308, ISSN

The experiments were conducted for varying diameter of columns at varying depth. Various types of geotextiles were also to used enhance the strength of soft soil. Stone columns repeatedly used for stabilization of soft soils. For the support of different structures, use of stone columns is increasing day by day. Stone columns are used for the improvement of settlement and bearing capacity of soft soils in reasonable fare and friendly towards the environment. To analyse the behaviour of stone columns used in different types of constructions such as oil storage tanks, embankments, buildings etc.

Abraham M. Woldemariam, Walter O. Oyawa and Silvester O. Abuodha, "Cypress Tree Extract as An Eco-Friendly Admixture In Concrete" International Journal of Civil Engineering & Technology (ICIET), Vol 5, Issue 6, 2014, pp. 60 - 69, ISSN Print: 0976 - 6308, ISSN

Ali k et al (2010) studied by conducting laboratory tests on stone columns to study bearing capacity and settlement characteristics of soil with and without encasement. The experiments were conducted for varying diameter of columns at varying depth. The results were verified by numerical method. Various types of geotextiles were also to used enhance the strength of soft soil. construction is being carried out on sites having extremely poor ground conditions like soft clays which pose serious problems like excessive settlements. For rigid structures such as multi-storeyed buildings, pile foundation is the best but for low rise buildings and, structures such as liquid storage tanks, bridge abutments, road/rail embankments, factories etc. Since stone columns having lengths more than six times their diameter do not contribute much to bearing capacity therefore, floating columns should be preferred in situations where hard strata is at a depth more than this length. The columns should be wrapped around with some geosynthetic material, by doing so the bearing capacity of improved ground is increased by manifolds.

III. MATERIALS AND METHODOLOGY

COLLECTION OF MATERIALS

A.SUGARCANE ASH: It seems like you're discussing the potential of using sugarcane bagasse ash (SCBA) as a partial replacement for cement and fly ash in the production of bricks. SCBA, a byproduct of sugar factories, is typically disposed of in ways that can harm the environment, such as spreading it over farms or dumping it in ash ponds. However, research suggests that SCBA can be effectively reused in construction materials like bricks due to its high silica content and pozzolanic properties.

The burning of sugarcane bagasse generates SCBA, which contains silica and exhibits pozzolanic properties. By incorporating SCBA into fly ash bricks, researchers have observed improvements in properties such as compressive strength and water absorption. The silica content of SCBA varies depending on factors such as burning temperature and duration, particle size, and chemical composition.

The initiative to find alternative uses for agricultural waste like SCBA not only helps in managing waste and preventing environmental pollution but also contributes to sustainable construction practices. By replacing cement and fly ash with SCBA in brick production, it's possible to utilize a valueless agricultural waste product effectively while enhancing the properties of the resulting bricks.

Research into SCBA utilization involves studying various parameters to optimize its effectiveness as a partial replacement for cement and fly ash. The aim of such studies is to evaluate the feasibility and potential benefits of incorporating SCBA

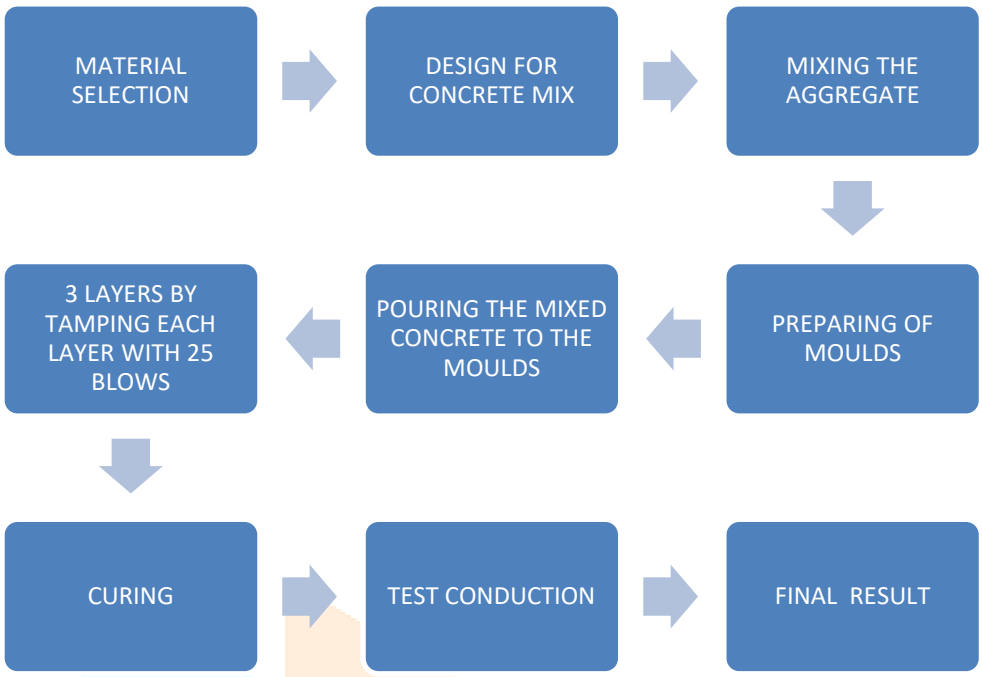
Fig 1: SUGAR CANE ASH

B.CEMENT: Cement powder, here conditioned in bag, ready to be mixed with aggregates and water. Dispersing dry cement dust in the air should be avoided to prevent health issues.cement is a binder, a chemical substance used for construction that sets, hardens, and adheres to other materials to bind them together. Cement is seldom used on its own, but rather to bind sand and gravel (aggregate) together. Cement mixed with fine aggregate produces mortar for masonry, or with sand and gravel, produces concrete. Concrete is the most widely used material in existence and is behind only water as the planet's most-consumed resource.

Fig 2 : Cement

IV METHODOLOGY

PROCEDURE FOR CONDUCTION OF EXPERIMENTS



V. LOAD CAPACITY

Fig 3: COMPRESSION TEST

VI RESULTS

The present study is intended to evaluate the compressive strength of porous concrete with partially replacing cement with sugarcane ash. For the purpose, cubes of 150 mm are prepared with different percent of replacement ranging from 0% to 1.5%. At an increment of 0.5% cubes for compressive strength were tested for 7 ,14,and 28 days.

The results obtained by substituting varying sugarcane ash(0.5 % , 1.0% ,1.5%) are not achieving the target strength of 26.6 N/mm^2. So the project results wear less than 26.6N/mm^2 . In this project the substitution of cement with sugarcane ash of varying percentages (0.5%,1%,1.5%) was not successful

VII CONCLUSION

Permeable pavement systems enable hydrologic function by infiltrating rainfall and contributing stormwater runoff while also supporting vehicle and pedestrian traffic. These systems can reduce pollutants discharged in runoff by infiltrating and filtering storm water .Pervious concrete has proven to have a broad scope and a promising future for the research of eco-friendly materials for the construction of pavements throughout the world. In conclusion, the case of study of the application of a pervious concrete overlay in an airport infrastructure is proposed.

VIII. REFERENCES

1. Abraham M. Woldemariam, Walter O. Oyawa and Silvester O. Abuodha, "Cypress Tree Extract as An Eco-Friendly Admixture In Concrete" International Journal of Civil Engineering & Technology (ICIET), Vol 5, Issue 6, 2014, pp. 60 - 69, ISSN Print: 0976 - 6308, ISSN
2. Abraham M. Woldemariam, Walter O. Oyawa and Silvester O. Abuodha, "Cypress Tree Extract as An Eco-Friendly Admixture In Concrete" International Journal of Civil Engineering & Technology (ICIET), Vol 5, Issue 6, 2014, pp. 60 - 69, ISSN Print: 0976 - 6308, ISSN
3. T.V. Srinivas Murthy and Dr. Ajeet Kumar Rai, "Geopolymer Concrete, an Earth Friendly Concrete, Very Promising In The Industry" International Journal of Civil Engineering & Technology (ICIET), Vol 5, Issue 7, 2014, pp. 113 - 122, ISSN Print: 0976 - 6308, ISSN
4. Darshan S. Shah, Prof. J.R.Pitroda, "Assessment for use of Gravel in Pervious Concrete", International Journal of Engineering Trends and Technology (WETT) ISSN No. 2231-5381,Vol: 4, Issue: 10, October 2013, Page: 4306 – 4310
5. Ghafoori, N., and Dutta, S., "Building and Non pavement Applications of No-Fines Concrete," Journal of Materials in Civil Engineering, Volume 7, Number 4, November 1995
6. Ajamu S.O., Jimoh A.A. "Evaluation of structural Performance of Previous Concrete in Construction", International Journal of Engineering and Technology Vol 2 No. 5, May,2012
7. John T. Kevern, Evaluating Permeability and Infiltration Requirements for Pervious Concrete, Vol. 43, No. 3, 2015.
8. L. A. Pereira-de-Oliveira, M.C.S. Nepomuceno, J.P. Castro-Gomes, M.F.C. Vila, Permeability properties of self-compacting concrete with coarse recycled aggregates, Construction and Building Materials, Volume 51 (2013).
9. Yang, J. and Jiang, G. Experimental Study on Properties of Pervious Concrete Pavement Materials. Cement and Concrete Research, 33, 381-383, 2003.
10. Xiang Shu, Baoshan Huang, Hao Wu, Qiao Dong, Edwin G. Burdette, Performance comparison of laboratory and field produced pervious concrete mixtures, Construction and Building Materials, Volume 25, Issue 8, 2011.
11. Saeid Hesami, Saeed Ahmadi, Mahdi Nematzadeh, Effects of rice husk ash and fiber on mechanical properties of pervious concrete pavement, Construction and Building Materials, Volume 53, 2014.