HOUSING AND BUILDING RESEARCH INSTITUTE

MINISTRY OF HOUSING AND PUBLIC WORKS

ABSTRACT OF RESEARCH OUTCOMES

2017/18 - 2023/24

www.hbri.gov.bd

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01

Promoting sustainable building in Banglades

Switch Asia II

Abstract

The project has been implemented within the period of January 2016 to June 2019. Overall contract value was 2,000,000 EUR. The project was implemented by HBRI, Jagoroni Chakra Foundation, Oxfam and BELA. It aimed at reducing the negative impacts of the construction industry in Bangladesh on the environment, livelihoods and communities, by enabling a transition from unsustainable Traditional Bricks (TB) to Alternative Building Blocks (AB). Drawing on the assumption that market incentives can lead to an effective and long-term transformation of the sector, the project worked to create the enabling policy environment at the national level through intensive advocacy and coalition building, and to strengthen the demand-supply situation through raising user and consumer awareness about the benefits of Abs. Followings are results achieved after the project ends: Total of Seven (07) traders have been found in project locations that are selling following three types of AB and GC materials: Hollow block, Interlocking block, Pavement block. Brick Manufacturing and Brick Kiln Establishment (Control) (Amendment) Act, 2019 has been passed due to significant role of the project's lobby-advocacy efforts. The proportion of respondents living in project sites that reported to have used GC material in construction of their houses stands at 8.9 percent overall, with similar frequencies found in Dhaka (9.5%) and Jashore (8.6%) (3rd MEAL) Overall, 20% of the targeted consumer's groups have reportedly consumed GC materials in construction of their houses. Two of the MSMEs are manufacturing different types of ABs in the project area.

Project duration: july 2017 - june 2019

02

Technical development to upgrade structural integrity of buildings in density populated urban areas and its strategic implementation toward resilient cities in Bangladesh

Researcher(s): (Bangladesh Part):

1. Prof. Dr. AFM Saiful Amin, Professor, Department of civil engineering, BUET
2. Md Rafiqul Islam, Superintending Engineer, Public Works Depaerment (PWD)
3. Dr. Md. Akter Mahmud, Professor, Department of Urban and Regional Planning, JU
4. Md. Shakhawat Hossain, Principal Research Engineer, HBRI
5. Dr. Shafiul Islam, Senior Research Engineer, HBRI
6. Md. Arifujjaman, Senior Research Engineer, HBRI etc.

Senior Consultant: Md. Abdul Malek Sikder, Md. Abdur Rahman Bhuiyan

Project Director: Md. Ashraful Alam

Abstract

Bangladesh is located in an earthquake-prone region and has been under the rapid growth of economy and urbanization, causing densely constructed and populated cities. Although the Bangladesh National Building Code (BNBC) including seismic provisions was first published in 1993 and the revised code BNBC 2020 was enforced very recently, older buildings and even some newer buildings have not been constructed with proper seismic design concept and/or supervisions, leaving a huge number of existing vulnerable buildings in urban centers to future earthquake events. Seismic evaluation and retrofitting of such vulnerable buildings are therefore of great urgency for a safer and more resilient society to future damaging earthquakes, which is also a key for a continued and sustainable development of the society. The major tasks and expected outputs from the SATREPS-TSUIB project include the development of seismic evaluation and retrofitting procedures that are suitable for reinforced concrete buildings in Bangladesh with scientific

evidence and data, and this report offers evidence-based and practical guidelines and recommendations derived after the 6-year research project. In developing countries, such as Bangladesh, an enormous stock of vulnerable buildings is to be considered for detailed seismic evaluation, which requires a rigorous analysis with much expertise, cost, and time. In this regard, identification of the most vulnerable buildings through rapid visual screening, and prioritization of those buildings to conduct detailed evaluation are the effective ways to reduce the aforementioned limitations. Therefore, it is very essential to develop a rapid seismic evaluation method considering the aforementioned parameters influencing the seismic capacity of an existing RC buildings. The proposed VR method considers cross-sectional area and shear strength of vertical elements such as RC column, masonry infill wall, and RC wall as well as other building attributes such as structural configuration, deterioration and age of building.

Project duration: April 2016 - July 2022 (Revised)

Project cost: 1515.52 lac (GoB part)+ 3638.05 lac (Development partner_JICA part)
Total=5153.67 lac BDT only

03

Verification survey with private sector for disseminating Japanese technologies for non-fired solidification brick manufacturing process

Abstract

The burned clay bricks are playing an important role in construction activities in Bangladesh. To meet the demand, large numbers of brick fields have been grown up in and around the cities and towns causing detrimental effect on the environment as well as crop producing alluvial agricultural land. The brick-field owners are using the top soil from the agricultural land for their better products turning the fertile land into barren one. If it is continued like this, the country would be going to face a serious food crisis in near future. To avoid aggravated situation in food sector, the Government of Bangladesh has given more emphasis on introduction of new or innovative building materials which can replace the burnt clay bricks. In the 7th FY Plan of the Govt. of Bangladesh, it is specified, “Housing and Building Research Institute will focus on bringing innovation including alternatives to traditional bricks with target of achieving zero use of agricultural top soil for brick production”.

Reflecting the Government’s planning and in consideration of the global warming and environmental pollution a development project entitled, “Verification Survey with the Private Sector for Disseminating Japanese Technologies for Non-Fired Solidification Brick Manufacturing Process " has been taken up by Housing and Building Research Institute (HBRI) on July 2017. Hence, the project had been aimed to develop technologies for the production of Non fired solidification bricks as the alternative to conventional bricks.

Project duration: July 2017 - June 2019

04

In-situ load test of two storied ferrocement experimental house at HBRI campus

Engr. Md. Arifujjaman[1], Engr. Indrajit Paul[2], Engr. Asif Raihan[3]

Abstract

Ferrocement is a versatile construction material and it is used widely in developing countries for housing, sanitation, agriculture, fisheries, water resources, water transportation (both in freshwater and marine environment), biogas structure, etc. The uniform distribution and high surface area to volume ratio of its reinforcement results in better crack arrest mechanism. This property makes ferrocement as an ideal tool of repairing and re-strengthening of older and deteriorated structure/structural members. This research work is focused on nondestructive evaluation of a two storied ferrocement experimental house inside HBRI premise. The in-situ load test technique for concrete systems mentioned in the ACI 318 Building Code Requirements for Structural Concrete, namely the 24–h load test method and its evaluation criteria has been in use for several years. The primary goal of load testing is to demonstrate the safety of a structure. Load test do not determine the design strength or load carrying limit. In general, load tests can be used to determine the ability of a structure to support additional loads, to establish the safety of structures. The method to be followed is by providing gravity load with water because of its relatively low specific weight and also water is typically feasible when the test loads do not exceed 200 psf. The first floor and roof floor were filled with water step wise and the deflection at suitable points was measured. The total test load was maintained for a period of 24 hour. Test results showed that the structure had adequate strength for future use. Further studies could confirm the findings of previous researchers by a combination of tests, instead of performing just one type of test. It would provide more suitable results to confidently accept or reject the structure as a whole or its component for future use.

Project duration: July 2020 - June 2021

05

Development of ecofriendly sustainable non fired Geo-polymer brick using local Geo-resources

Md. Abdullah Al Mamun[1], Rabaya Khair Nithy[2], Md. Jahid Shahshuja[3]

Abstract

To reduce greenhouse gas emissions, efforts are needed to develop environmentally friendly construction materials. The aim of this study is to develop an alternative non-fired non-cement block using local geo-resource waste products of Bangladesh, production of which emits almost zero CO2 that is eco-friendly and sustainable. Geopolymer block is innovative green concrete in which binding properties are developed by the interaction of inorganic materials which are rich in silica and alumina. Silica rich fly ash form Barapukuria Coal power plant and local dredging sand and alumina rich meta kaolin reacting with alkaline solution produces aluminum silicate gel that acts as the binding material for the block. A number of tests has been carried out to check the feasibility of geo polymer block as an alternative building material.

Project duration: July 2020 - June 2021

06

Effect of admixture on the physico mechanical properties of sand cement block

Ahsan Habib[1], Md. Ashraful Alam[2]

Abstract

Conventional building materials like fired clay brick and concrete blocks have some detrimental effects on environment. Sand Cement Block (SCB) can be considered as effective alternative building materials which can be easily prepared using locally available dredged sand, Portland cement and additives. This study has been planned to investigate the effect of additives on the mechanical and physical properties of the SCB. A series of SCB specimens were prepared using varying proportions of Portland cement, dredged sand and admixture following standard methods, and the prepared specimens were evaluated on the basis of compressive strength and water absorption properties. Experimental result showed that properties of SCB varied with the addition of admixture. SCB preapared by using Portland cement and dredging sand at the ratio o of 1:4 showed compressive strength of 10 MPa and water absorption of 12%, while addition of 0.12 wt % admixture (on the basis total mass) the compressive strength of SCB increased 16% and water absorption capacity decreased up to 48% compared to control specimen (SCB without admixture).Preliminary result shows that SCB will be cost effective compared to conventional fired clay bricks.

Project duration: October 2021 - June 2023

07

Comparative study of the effect of different types chemical admixtures in cco-friendly sand cement block

Md. Wahab. Ali1[1], Md. Jahid Shahshuja[2], Ahsan. Habib[3] and Md. Nafizur Rahman[3], Md. Ashraful Alam[5]

Abstract

The study was conducted at the Department of Building Material Division, Housing and Building Research Institute, Dhaka- 1216, Bangladesh during from October 2021 to April 2023 to investigate the minimum cement content required with an appropriate water-to-cement ratio (w/c) to meet given workability, strength, and durability requirements in a sand cement block and to reduce carbon dioxide emissions, energy consumption and costs. Contaminated and unused dredged sand may turn into national wealth if it is utilized properly. Along with a small ratio of Composite Portland cement (25%), required portion of dredged sand and a negligible percentage (0.5 to 1.5%) of admixture has been used during the research at Housing and Building Research Institute. Having been made the raw blocks manually and automatically, blocks were cured for 28 days to check the ultimate compressive strength, water absorption. From the perspective of cost and benefit, we have calculated that it outright cost-effective and environment gets enormous benefit. This new, effective idea and solution can also certainly lessen the problem of dredging sand disposal and produce eco-friendly construction materials.

Project duration: October 2021 - June 2023

08

A Study on the environmental performance of sand cement block building envelop as a sustainable alternative of clay burnt bricks in Bangladesh

Background

Buildings are responsible for a paramount consumption of energy worldwide. In Bangladesh due to rapid urbanization, energy consumption in building is increasing tremendously every year. Conventional clay burnt bricks are widely used building material in Bangladesh which causes massive pollution and declination of fertile agricultural topsoil along with huge energy consumption in production. Sustainable building material like concrete hollow blocks can have great impact on reducing energy consumption of Bangladesh. As a part of the research and development of Alternative Building Technology at Housing and Building Research Institute (HBRI), extensive research has been done on several buildings made by concrete hollow blocks in Dhaka City. The combined effect of air temperature and relative humidity in overheated period has been investigated and comparative analysis has been done with conventional clay brick buildings. This study provides analysis of thermal performance of Concrete Hollow Block and recommendations of sustainable building materials ensuring thermal comfort in Bangladesh.

Project duration: August 2022 - June 2024

Key Researcher: Monjur Parvez Senior Research Architect (A.C), HBRI

09

Study of rain water quality in and efficiency of storage tank made of RCC ring

Background

In this era, where global climate change is a pressing issue, freshwater is becoming progressively rare as temperatures and sea levels rise due to global warming. Despite Bangladesh's efforts to address water demand and improve health and sanitation, a huge number of people still lack access to safe drinking water. Each year, many Bangladeshis die from water-borne diseases in salinity-prone coastal areas and arsenic hotspots. Although Bangladesh receives significant annual rainfall, which could meet much of the water demand, both urban and rural populations continue to rely on groundwater extraction without considering sustainability. The overall context represents; the time is near when people might face a permanent water crisis. Given the current scenario, we must rethink our water use practices and implement alternative water resources. One of the most promising options is the installation of rainwater harvesting systems.. Therefore, this research aims at introducing a basic, reasonable, in fact, doable, and socially acceptable rainwater storage system. Additionally, it investigates the quality of the stored rainwater to ensure the efficiency of the storage tank

Project duration: July 2020 - October 2023

Key Researcher: Nahid Ferdous Dristy, Research Architect

10

An experimental study of impact of cool roof to reduce urban heat island effect

Nahid Ferdous Dristy[1], Monjur Parvez[2], Md. Nafizur Rahman[3]

Abstract

The “Roof” of a building encounters the maximum exposure to solar radiation and often causes an uncomfortable indoor environment. Apart from that, the warm roof emanates heat into the environment, which in the long run, turns atmospheric air warmer and acts as a driving agent to a phenomenon known as urban heat island. As urbanization accelerates nationwide, driven by economic and infrastructure development, the unchecked informal construction sector exacerbates the creation of urban heat islands. To mitigate the adverse impacts of this phenomenon, it is crucial to reevaluate conventional roofing approaches and adopt system-oriented, contextualized treatments. A well-designed roof with appropriate treatments can provide a simple and economical solution to this growing problem, creating a naturally comfortable environment both indoors and outdoors.

This research aims to conduct an experimental study to analyze the thermal performance of different cool roof treatments. By comparing the thermal performance before and after the installation of cool roof treatments on RCC and ferrocement roofs, the study will also evaluate overall cost-effectiveness to promote suitable roofing treatments

Project duration: January 2022 - June 2024

11

Effect of sand collection from different river bed on the properties of sand cement block

Md. Ashraful Alam[1], Architect Nafizur Rahman[2], Ahsan Habib[3], Ismail Hossain[4], Sajjad Hossain[5]

Abstract

Bricks produced from traditional techniques and agricultural clay contribute considerably to the air pollutions in the world. Therefore, an urgent need to start using an environment-friendly alternative material/approach to save the fertile topsoil and conserve a clean environment. The main goal of this project to collect sand from the different riverbed of Bangladesh and the physical & chemical properties of different riverbed sand, Study the mechanical properties of blocks according to ASTM standers as well as to create digital maps containing the location and information of the river. To complete this project work, the sand samples were collected from the selected rivers and the following properties were investigated in the laboratory, fineness modulus by sieve analysis, unit weight, specific gravity, percentage of voids, slit content, water absorption, salinity, pH, TDS and conductivity by traditional procedure, grain sizes (D10, D30, D60), and co-efficient of uniformity (Cu), co-efficient of curvature (Cc) from the gradation curve of fine aggregate. Bulk density determination, water absorption test and compressive strength of the individual blocks were done on the selected samples of Sandcrete blocks. Test results indicate that the aggregates are relatively suitable for block making. On crushing the Sandcrete blocks it was discovered that the compressive strength of the blocks are below the standard recommended by Public Works Department (PWD) schedule 2022 in Bangladesh with collected sand samples as fine aggregate with a mix ratio 1:4, 1:5, 1:6 and water-cement ratio 0.25, 0.30 and 0.35.

Project duration: July, 2021 - June 2024

12

Transition pathway of traditional brick sector towards non fired technology

Background

The brick sector in Bangladesh has long been a significant contributor to the country's construction industry and economic growth. However, the conventional practices employed in brick manufacturing have led to severe environmental degradation and health hazards. Therefore, developmental transformation is urgently needed in the brick industry by gradually shifting it towards cleaner processes and efficient technology. Considering all the drawbacks of the traditional brick sector, the Government of Bangladesh issued an order to replace clay-burnt bricks with non-fired eco-friendly blocks through a multi-phased transition started with the use of blocks in all Government Construction by 2025. Therefore, a significant construction industry change will have to occur to achieve this goal. This research paper presents an overview of the challenges of the transition process of traditional brick sector in Bangladesh with required recommendations. The successful transition of the brick sector in Bangladesh will lead to positive outcomes, including reduced greenhouse gas emissions, improved air quality, and enhanced occupational health and safety for workers. Additionally, the production of blocks will contribute to resource conservation and minimize land degradation associated with clay extraction. The government, along with related stakeholder, should play a crucial role in promoting these changes by providing policy support, financial incentives, and technical assistance to ensure sustainable development in Bangladesh, aligning with global goals for climate action and environmental preservation.

Project duration: July 2022 - June 2023

Key Researcher: Farhana Khandoker, Research Officer

13

On the development of fly-ash and GGBS based Geo-polymer concrete block

Kaniz Fatema[1], Md. Jahid Shahshuja[2],Md. Ashraful Alam[3], Architect Nafizur Rahman[4], Ahsan Habib[5]

Abstract

Geopolymer concrete blocks, also known as "green" and "environmentally friendly" concrete blocks, are a carbon-free binding material that can be used as the ultimate concrete block replacement. In fact, cement production accounts for 7% of global CO2 emissions. This leads to conflicts with the environment. At this point, the manufacturing of geopolymer concrete will have resolved all of the problems that were discussed before. In this paper, mechanical properties of fly ash and slag based geopolymer concretes (FAGPC-SGPC) were investigated. Geopolymer concrete includes coarse aggregate, fine aggregate, alkaline liquid, fly ash, Steel slag and water. The alkaline solution was prepared with a mixture of sodium silicate solution (Na2SiO3) and sodium hydroxide solution (NaOH) for geopolymer concrete. To make an alkaline liquid solution, sodium hydroxide solids were mixed with the water for about 5 minutes. The main objective of the study was to examine the usability of geopolymer concrete instead of ordinary Portland cement concrete blocks for structural use. In addition to this, this study was aimed at making a contribution to the standardization process of the geopolymer concrete in the construction industry. Geopolymer concrete made from fly ash and steel slag is more environmentally friendly and has the potential to replace OPC concrete in many applications, including precast units. Geopolymer technology not only helps cut down on greenhouse gas emissions, but it also cuts down on the cost of getting rid of industrial waste.

Project duration: July 2022 - June 2024

14

Ground improvement using alkali activated rice husk ash

Mosiur Rahman[1], Mahmud Hasan[2], Partha Saha[3] and Shriful Islam[4]

Abstract

Bangladesh is a densely populated country and hence river bank and coastal sites are frequently being used to construct buildings and other infrastructures. The sub-soil of river bank and coastal area mainly consist of loose sands, which require ground improvement to increase their load bearing capacity to construct sustainable infrastructures. Ground improvement is a common method in geotechnical engineering which is essentially used to minimize the construction cost and post-construction failure of the structures by improving the existing ground condition of the construction site. The most commonly used soil improvement techniques are sand drains, preloading, cement grouting. Sand drain may lead to cavities, preloading is time consuming process and cement grouting is an expansive method. Rice Husk Ash (RHA) based geopolymer might be an alternate solution for ground improvement. RHA is frequently used as a waste material in Bangladesh. Therefore, the RHA activated by sodium hydroxide (NaOH) is used for soil stabilization in this study. The main purpose of this study is to determine the geotechnical properties of loose sand treated with RHA to develop a cost-effective and environmental friendly alternative ground improvement technique. Then, the engineering properties were determined by the laboratory tests of the untreated soil. Then the soils are mixed with RHA and calcium carbonate with a proportion of 5%, 10%, 15%, 20% and 2%, 4%, 6%, 8%, respectively. The mixed soils are activated by sodium hydroxide. After that, the engineering properties of the treated soil were determined using unconfined compressive strength test. It is observed that the alkali activated RHA based geopolymer can produce considerable amount of solidification of the soil. It is believed that this research will provide a basic guideline for ground improvement using alkali activated rice husk ash that is suitable for loose sand.

Project duration: July 2023 - June 2024

15

Comparative study between concrete block (CB) aggregates and other conventional aggregates

Syed Ahmed Tasnim[1], Md Ibnul Warah[2], Forhad Hossain[3], Md Arifujjaman[4]

Abstract

The Government of Bangladesh's recent push is boosting the private sector's growth in sand-cement blocks. With this growth, new challenges are emerging. In Bangladesh, using clay brick aggregate instead of crushed stone in concrete is common. The availability of sand-cement blocks introduces another aggregate source. This study explores using block aggregate in concrete by comparing it with crushed stone and clay-brick aggregates. Each aggregate underwent tests for gradation, moisture content, water absorption, crushing value, and abrasion loss. Concrete cylinders were then made with each type in a 1:1.5:3 ratio, and their compressive strength was tested. The study found that the workability of sand-cement block aggregate is similar to that of stone and has compressive strength comparable to brick aggregate at 28 days. However, its use is limited by high crushing and Los Angeles abrasion values.

Project duration: February 2022 – June 2023

16

Study on steel-ferro cement structure considering sustainable construction in Bangladesh

Background

Housing and Building Research Institute (HBRI) is working closely on eco-friendly, alternative construction materials and technologies for a long time. As a continuation of that, HBRI is trying to develop modern, contextual, and sustainable building technologies contextually.

The construction popularity of steel as a green material is increasing day by day for its better earthquake resilience, time, and cost-efficiency. On the other hand, Ferro-cement is popular for its lightweight and flexible characteristics. HBRI is opting to introduce and promote these technologies as a sustainable combination in the local context.

Project duration: April 2022 - June 2024 (extension required)

Key Researcher: Md. Ibnul Warah, Research Engineer

17

Seismic behavior of RC frames in filled with sandcrete blocks

Background

In developing countries such as Bangladesh, an enormous stock of seismically vulnerable RC buildings is to be considered for seismic evaluation and retrofitting which requires a rigorous analysis with much expertise, cost, and time. Identification of the most vulnerable buildings and retrofitting prioritization is an effective way for dealing a seismic evaluation and retrofitting scheme of large number buildings stock. For this instance, a rapid visual screening method, referred as Visual Rating (VR) method, and detailed seismic evaluation method are developed thorough SATREPS-TSUIB project (2016-2022), a JICA-JST supported research project in Bangladesh. The VR method estimates seismic capacity of existing RC buildings in terms of Visual Rating index (IVR) which considers cross-sectional area and shear strength of vertical elements such as RC column, masonry infill wall, and RC wall as well as other building attributes such as structural configuration, deterioration, and age of building. This research project aims: (i) to apply these developed seismic evaluation methods in large building stock in the most vulnerable cities in Bangladesh; (ii) to develop a strategy for retrofitting prioritization of existing RC buildings in BangladeshThese surveyed buildings are categorized and prioritized for detailed evaluation according to IVR score. It has been observed that about 35% of the surveyed buildings are categorized into less to highest priority of detailed seismic evaluation for retrofitting. Afterward, several existing RC buildings have been evaluated based on developed the seismic evaluation method thorough the SATREPS- TSUIB project. Seismic retrofitting is recommended to the buildings with low seismic capacity and below the seismic demand. This research outcome is helpful to prepare a seismic retrofitting prioritization map which will be helpful for road-map towards screening large number of existing buildings stock in future.

Project duration: April 2022 - June 2024

Key Researcher: Dr. Md Shafiul Islam, Senior Research Engineer

18

Different types of industrial ETP (Effluent treatment plant) sludge; Their characterization and utilization of building materials

Background

The rapid increase in construction activities leads to scarcity of conventional construction materials such as cement, fine aggregate and coarse aggregate. Researches are being conducted for finding cheaper materials. The national economy of Bangladesh mostly depends on the Textile and Garment industry. Solid sludge is inevitable for the wastewater treatment facility for textile industries. In Bangladesh, there are many industries producing large amount of effluent treatment plant waste sludge which leads in problems of disposal. The final destination of effluent treatment plant sludge affects the environment. So alternative option is necessary for disposing effluent treatment sludge. In this study is subjected to the effective reuse of effluent treatment plant sludge pigment generated from DBL Textiles Ltd, GMS Textiles Ltd and Dhaka WASA. The aim of the research is to determine the strength parameters of concrete with the partial replacement of fine aggregate by waste sludge from DBL, GMS and WASA. Reuse of ETP sludge in concrete is an effective option for the problem of ultimate disposal up to greater extent. In this study the fine aggregate is replaced by the ETP sludge with different percentages such as 5%, 10% and 15% in M20 concrete mix. The various tests such as compression, tensile and flexural strength are conducted

Project duration: July 2022 - June 2024

Key Researcher: Kaniz Fatema, Senior Research Officer

19

Use of rice husk ash as a source of silica content in AAC block

Background

The RHA is generally used as fuel in rural areas and a small quantity is used as animal feed. Huge quantity of rice husk ash (RHA) is generated in Bangladesh during the boiling of rice in rice mills. This ash is treated as a waste material usually dumped at the backyard causing unforeseen environmental hazards. No systematic efforts have yet been made for the exploitation of this replenishable major agricultural by-product on a commercial basis due to the lack of detailed characterization of the RHA produced in Bangladesh. RHA is predominantly silica together with some minor oxides. The nature of this silica depends on the burning temperature. Controlled combustion of RH produces reactive which is suitable for making pozzolana cement. It is reported that silica present in RHA remains amorphous up to 973 K. With further increase in temperature, crystallization of silica occurs. Due to the presence of high silica content in Rice Husk Ash, it can be used as a key raw material in Autoclaved Aerated Concrete (AAC). This study provides the efficiencies of Rice Husk Ash as a source of Silica content and compressive strength-gaining factor.

Project duration: July 2023 - June 2025

Key Researcher: Md. Mohebbullah, Research Officer (AC)

20

Ground response due to ground water depletion and its effects on submission

Background

Groundwater depletion has become an alarming problem in the Dhaka city nowadays. Water table goes down by almost 1 m every year. The depletion of ground water table causes release of stress and pore pressure. This change in soil condition might influence the seismic wave induced by earthquake. Therefore, this study was executed in order to find out the relation between seismic wave and ground water depletion and thus anticipate if ground water depletion might increase seismic hazard. The study area was selected to be Dhaka for being the most vulnerable to groundwater exploitation. The groundwater condition and extraction data, subsoil strata data, seismic history of Dhaka, Bangladesh and respective nearby tectonic plates etc. data were collected and assessed. Numerical model for the relation between seismic wave and groundwater depletion has been developed. Two-dimensional finite element analysis was conducted. Analyses were calculated for downward depths of ground up to rock strata. The numerical model was calibrated according to the field data of standard soil condition of Bangladesh. The study revealed that the seismic wave gets amplified or attenuated to a certain extent due to the lowering of groundwater. The amplification rate of change was calculated and labeled in accordance with the severity of risk. The obtained results can be helpful to understand the seismic hazard in our country. It can also provide a new dimension in the micro-zonation of seismic hazard in Dhaka city.

Project duration: September 2022 – June 2024

Key Researcher: Farzin Hassan Moumita, Research Fellow

21

A study on the load carrying capacity of an axially loaded single pile in Bangladesh perspective

Sammyha Jahan[1], Partha Saha[2], Md. A Alam[3], Indrajit K Paul[4] and Mohammad P Khadem[5]

Abstract

Piles are frequently used in Bangladesh for the construction of deep foundation. Determination of the appropriate axial load carrying capacity of a single pile is very important to ensure the safe and economic design of the structures. The load carrying capacity of pile can be estimated from various empirical formulas. However, their reliability and applicability may vary with the geographical regions and the soil types. This research aims to assess the reliability of globally recognized empirical formulas for estimating the load carrying capacity of axially loaded single piles in Bangladeshi soils. The pile load test data and the corresponding subsoil investigation reports have been collected from several construction projects all over the country to achieve the objectives. Fifteen precast piles and fifteen cast-in-situ piles data have been collected. In this study, three empirical formulas proposed by Meyerhof (1976), AASHTO (1986) and BNBC (2020) have been used for estimating the axial load carrying capacity of cast-in-situ single piles. Similarly, another three empirical formulas named Meyerhof (1976), Tomlinson (1994) and BNBC (2020) have been used for precast piles. The static pile load test result has been analyzed by Davisson method. It has been observed that Meyerhof (1976) formula provides the best correlation with the measured load test result both for cast-in-situ piles and precast piles. The authors believe that this research will recommend the basic empirical equations suitable for Bangladeshi soil conditions, thus the engineers can accurately predict the pile capacity, ensuring a safer and cost-effective foundation design.

Project duration: July 2023 - June 2024

22

Preparation of high performance self-compacting concrete using different industrial by-products and steel fiber

Abstract

Introducing high-performance self-compacting concrete (HPSCC) is among the most promising developments in the building sector. Superior strength, endurance, uniformity, improved microstructure, and reduced segregation are features of HPSCC. The mix design for this concrete needs to be adjusted to account for its high strength and capacity for self-compaction. In HPSCC, supplemental cementitious materials like fly ash (FA) can be employed to reduce the amount of cement needed and the CO2 emissions that come with its manufacture. Steel wire mesh may be a way to improve the tensile performance of traditional concrete, which has comparatively low tensile resistance. In the current study, steel wire mesh (0.5% and 1%) and fly ash (5%) in place of CEM II (cement) are utilized, and their fresh, mechanical, and durability qualities are compared with the control concrete sample. Additionally, to make a basic HPSCC and to compare it with the fly ash and steel wire mesh-based mix, a sample without fly ash and steel wire mesh is produced. The fresh qualities were examined and verified with the help of Slump flow, T 500, and V-funnel. Compared to the other samples, the results generally show an improvement in the mechanical properties of the produced concretes with 5% fly ash and 1% steel wire mesh. Although all HPSCC mixes satisfy the fresh property parameters, the fresh properties are better in HPSCC without fly ash and steel wire mesh. The results demonstrate the benefits of utilizing fly ash and steel wire mesh.

Project duration: July 2023 - June 2024

Key Researcher: Tabassum Binte Reza, Research Fellow

23

Effect of salinity on concrete structure in coastal region

Mohaimin-Ul-Islam[1], Md. Arifujjaman[2], Md. Ibnul Warah[3], Mohammad Parvez Khadem[4], Md. Ashraful Alam[5]

Background

Salinity poses a significant challenge in coastal areas, impacting various aspects of the environment and infrastructure. In these regions, groundwater serves as a vital source of drinking water due to the presence of salinity. However, the ingress of seawater can infiltrate coastal structures, leading to detrimental effects. Water can permeate through the concrete structure via its pores, eventually reaching the reinforcement and causing its deterioration. The utilization of groundwater in numerous construction activities further exacerbates the scarcity of fresh water. The intrusion of salinity, intensified by rising sea levels and climate fluctuations, poses a growing menace to the availability of potable water sources in coastal areas. Consequently, the coastal regions of Bangladesh face a pressing issue of limited access to safe drinking water. Opting to use fresh water sources for construction purposes will only contribute to the exacerbation of this problem. This study provides an analysis of the effect of salinity if it replaces fresh water in both casting and curing. The study also discusses about the effect of manual mixing and consolidation and compares with the mechanical process. The survey part of the study focuses on the current condition of the RCC structures in the coastal regions and also has some recommendations for future implementations.

Project duration: July 2022 - June 2024

24

BIM based simulation for smoke effect assessment to improve fire safety management

Sabrin Sultana[1], Md. Jahid Shahshuja[2], Md Wahab Ali[3] and Md. Nafizur Rahman[4]

Abstract

The constant change in architectural landscape due to high-rise buildings, complex and confined spaces are making fire calamities more diverse and difficult to predict. Over the past ten years, researchers and practitioners have benefited from the use of computer-based simulations (CFD) to assist with fire safety design. The Fire Dynamic Simulator (FDS), one of the most well-known CFD modeling tools for fire safety, predicts fire behavior and spread, partially in real-time. Both the plans and the tactics used to put out building fires rely on fire analysis, which is typically based on accurate fire simulations. Because of this, Building Information Modeling (BIM) makes it possible to create accurate, three-dimensional representations of structures that are detailed, realistic, and include information on the material's thermal properties. With the aim of preventing fire hazards in residential buildings, this study employs PyroSim, a CFD program, to numerically simulate a building model in order to investigate the impact of parameters that affect human evacuation due to fire and different building materials such as brick, hollow block, and Autoclaved Aerated Concrete (AAC). Fire simulation situations are divided into different fire zones by looking at factors like temperature, smoke density, and visibility in the smoke layer inside a building. The critical fire hazard judgment circumstances are used to determine the Available Safe Evacuation Time (ASET). Finally, in order to ensure the security of a building and its occupants during the design stage of construction, this analysis is assessed, and fire prevention countermeasures are defined based on the actual situation and the results of fire numerical simulation to reduce the likelihood of fires, casualties, and financial losses.

Project duration: July 2023 - June 2024

25

Experimental study on the behaviour of RC beam-column joint retrofitted with reinforcement jacket under cyclic loading

Mohaiminul Hassan[1] ,Debasish Sen[2],Wahidul Islam[3]

Abstract

Bangladesh has already been known to be an earthquake-prone area. Here, almost all residential buildings are reinforced concrete (RC) structures. In RC buildings, portions of columns that are common to beams at their intersections are called beam-column joints. Since their constituent materials have limited strengths; the joints have limited force carrying capacity. When forces larger than these are applied during earthquakes, joints are severely damaged

Ferrocement laminates is a proven material for the general purpose repair of RC structures. Over the past three decades, the use of ferrocement has gained tremendous popularity in different areas of civil engineering. Therefore, the present study has been aimed at performing some experimental investigations using ferrocement in retrofitting/strengthening RC beam- column joints.

Project duration: July 2023 - June 2024

26

Utilization of waste iron slag as the fine aggregate (sand) material in concrete block for low-cost application

Sajjad Hossain[1], Md. Ashraful Alam[2], Md. Motaher Hossain[3], Ar. Md. Nafizur Rahman[4] and Ahsan Habib[5]

Abstract

Bangladesh has a lot of environmental problems because of the production of industrial waste. The biggest problem Bangladesh faces is utilizing the massive by-products produced as a result of industrialization. One of the industrial wastes from the iron and steel manufacturing processes is iron slag. The majority of the studies that have been done focused on the replacement for these construction aggregates, but there is still potential for further research. The purpose of this study is to determine the effect of using replacements for fine aggregates. This paper presents the results of an experimental investigation on the properties of concrete block using iron slag as a partial replacement of fine aggregate (sand). Compressive strength, density and water absorption tests of concrete block are conducted at different replacement percentages (0%, 10%, 20%, 25%, 30%, 40%, 50%, 60%, 70% and 80% by weight) of sand by waste iron slag. The compressive strength of mortar is tested on the cube specimens (50.8 x 50.8 x 50.8) mm at 7 and 28 days with a water to cement ratio of 0.45. The average compressive strength of mortar measured at 28 days of (0%, 10%, 20%, 25%, 30%, 40%, 50%, 60%, 70% and 80%) of waste iron slag are 22.37, 20.87, 19.21, 26.87, 21.02, 20.17, 18.18, 16.45, 13.13 and 12.65 MPa respectively. The optimal value of compressive strength is achieved at 25% replacement as the iron slag percentage of concrete block increases rapidly. After 25% replacement the strength decreases. As concern, the density, the mortar made with waste iron slag has a higher density as compared to the specimens made without waste iron slag.

Project duration: July 2022 - June 2024

27

Utilization of insulator waste as aggregate in concrete block production

Kaniz Fatema[1] , Md. Imran Hossain[2], Md. Ashraful Alam[3]

Abstract

Over the past few decades, rapid urbanization and industrialization have made waste management one of the world's most significant challenges. One potential solution to mitigate the removal of insulator ceramic waste is to utilize it as an alternative material in the sand cement blocks, hence fostering an environmentally friendly approach. But now, in the civil engineering and construction materials research area, it has been found that these dumping materials have huge potential. Because ceramic insulator aggregates have cementitious properties, two types of ceramic insulator aggregates are used to produce concrete blocks in this research. This study investigates the replacement of Portland Composite Cement (OPC) with two types of crushed insulator aggregates, precisely 10mm and 3.56 FM size concrete blocks, which were made, tested, and compared with conventional bricks to determine their compressive strength through experimental examination. Two different types of tests were conducted to assess the mechanical properties of blocks throughout 7, 14, and 28 days. The main goal of this research is to determine the mechanical properties of concrete blocks by using ceramic insulator aggregate waste as a substitute for cement.

Project duration: July 2023 - June 2024

28

Development and characterization of polymer concrete

Background

Due to its superior performance over more traditional materials, polymer concrete has recently been created as a novel architectural material. In comparison to traditional portland cement concrete, polymer concrete offers several benefits, including strong mechanical qualities, quick hardening, durability, and resistance to chemical and biological influences. A sufficient amount of study has been done over the past several years, and it has been shown that polymer concrete may be used to enhance the building industry. The state of polymer concrete and its use as a sustainable construction material were evaluated by the writers in this article. Due to its superior performance as compared to conventional materials, polymer concrete has been developed as an innovative building material. Polymer concrete has many advantages over conventional portland cement concrete, including superior mechanical properties, rapid hardening, durability, and chemical and biological resistance. In recent years, a sufficient quantity of research has shown that polymer concrete has the potential to contribute to the development of the construction industry. In this paper, authors reviewed the status of polymer concrete and its application as sustainable building material.

Project duration: July 2023 - June 2024

Key Researcher: Md. Daud ibrahim, Research Fellow

29

Structural integrity assessment of masonry in filled reinforced concrete frame structure in seismic hazard

Background

As part of research continuation of SATREPS-TSUIB project at HBRI, finding the residual capacity by retrofitting of damaged RC frame due to seismic hazard was one of the focused future plans to achieve further goal of SATREPS-TSUIB Project. Research work to understand the failure mechanism of masonry infilled RC frame in terms of differential stiffness in the same frame is not available. At the same time without continuation of research work linked with SATREPS-TSUIB project, the world's latest and advanced technological research facility becomes nip in the bud. So, the failure mechanism and residual load carrying capacity under earthquake load is needed to be identified clearly. Research continuation by functional use of latest technological and advanced structural element testing and research facilities developed under SATREPS-TSUIB project at HBRI. Establishment of residual load carrying capacity model under cyclic load of damaged brick masonry infilled RC frame structure after retrofit.

Project duration: July 2022 - June 2023

Key Researcher: S. M. Muhaiminul Islam, Research Fellow

30

Seismic reliability of masonry and concrete block in filled RC frame

Background

Reinforced concrete frame structures have been widely used in the world due to their advantages such as flexible plane layout, easy access to large space, and easy construction. The infill wall is regarded as a nonstructural part in the design of RC frame structures in most countries in the world, and the influence of infill wall on the mechanical properties of the main frame structure has not been fully considered. However, the layout of infill walls in the structure is usually irregular, and the infill wall has a certain stiffness, which will share the shear force. Therefore, it may cause the shear force of the main frame of masonry infilled frame structure to be too large, which leads to safety risk. In several earthquake damage studies, it has been found that the damage of RC frame structure with infill walls was clearly different from that of the empty frame structure due to the interaction between the infill wall and frame, and there were many unpredictable failure modes. The infills contribute in stiffening the frames, but researches also show that the partial infills can cause adverse effect known as captive column effect. A lot of experimental evidences show that the captive column effect causes the partially infilled frames to damage during earthquakes. In addition, the commonly used solid clay bricks have been gradually replaced by some new masonry materials (including hollow brick, concrete block, etc.), and the mechanical properties of the new masonry materials may be different from the traditional clay bricks, regarding alternative to burnt clay bricks, concrete block (Thermal block) is one of them. As no burning is required so this block will be environment friendly, sustainable, and cost effective.

Project duration: July 2022 - June 2023

Key Researcher: Anik Das, Research Fellow

31

Properties of concrete containing ceramic waste powder as a partial replacement of cement

Background

There are 65 ceramic manufacturing companies in the country. Bangladesh's ceramic tile industry is still going strong. With an annual supply of more than 12 billion square meters, waste ceramic tiles are widely used in the construction industry. Unfortunately, the ceramic powder produced in the process of polishing tiles in an unusually large quantity, with an estimated measure of 19 kg of waste powder for each one square meter of cleaned tiles. In the ceramic industry, about 15%-30% production goes as waste. These wastes pose a problem in present-day society, requiring a suitable form of management in order to achieve sustainable development. However, the excess of ceramic waste powder (CWP) indicates that it may be used as a concrete remedy. A few studies have been published on the use of CWP as a binder substitute. Their findings revealed that CWP has pozzolanic effects, which improved the performance of the mortars studied. An experiment was conducted to see whether two types of porcelain Polishing Residue (PR) could be used as a cement substitute in mortars.

Project duration: July 2023 - June 2025

Key Researcher: Rubel Rana, Research Engineer

32

Recycling of demolished concrete waste for sustainable concrete production

Background

In developing countries like Bangladesh, because of population growth and innovation of new design and technologies old structures are being knocked down and new structures are constructed as a replacement. The debris from demolished buildings results in a plethora of waste concrete. Expanding urbanization and enormous construction activities related with fast economic development has produced a huge amount of C&D waste in Bangladesh, which sequentially has triggered a severe degradation of the environment. Therefore, research on the utilization of recycled aggregate has become necessary for the construction sector. The main objective of this study is sustainable use of demolished concrete waste for new construction work and to minimize the construction cost as well. It is expected that this research will investigate the performance of concrete made by demolished concrete waste as coarse aggregate. This research will also investigate the cost comparison of recycled concrete with conventional brick chips concrete. Recycling of demolished concrete is an environment friendly practice because it can reduce carbon emissions and environmental impact due to its sustainable use in construction sector.

Project duration: July 2023 - June 2025

Key Researcher: Md. Amran Hossain, Research Engineer

33

Comparative study among the different conventional roof treatment methods in Bangladesh

Background

Bangladesh experiences a tropical monsoon climate, marked by hot and humid summers followed by a rainy season with heavy downpours. These climatic conditions pose challenges to the durability and integrity of roofing materials. Excessive moisture and high temperatures can lead to the deterioration of roof structures, resulting in leaks, water damage, and compromised thermal performance. As a response to these challenges, a variety of conventional roof treatment methods have been developed over time to safeguard buildings and enhance their longevity. The rapid urbanization and changing socio-economic landscape in Bangladesh have led to a mix of traditional and modern construction practices. This dynamic has raised questions about the effectiveness, sustainability, and cultural relevance of various roof treatment methods. As the country strives for development, it is essential to assess these methods in a comprehensive manner, considering factors such as their performance, cost-effectiveness, environmental impact, and alignment with local architectural traditions. This research aims to bridge the gap in understanding by conducting a comparative study of different conventional roof treatment methods in Bangladesh. By analyzing the technical attributes, cultural significance, and overall performance of these methods, the research seeks to provide valuable insights for architects, engineers, builders, and policymakers. The goal is to facilitate informed decision-making regarding roof treatments that are resilient, sustainable, and in harmony with both the climatic conditions and cultural heritage of Bangladesh.

Project duration: July 2023 - June 2025

Key Researcher: Md. Ariful Islam, Research Engineer

34

Study on performance of high strength steel (600 W) with different normal graded concrete

Background

The construction industry in Bangladesh has been experiencing substantial growth due to urbanization and infrastructure development, leading to a demand for resilient and sustainable structures. This growth has prompted engineers and researchers to explore innovative materials and construction techniques, including the bonding performance between high strength steel and normal strength concrete, which is crucial for the structural integrity of reinforced concrete structures in the country. The use of High Strength Steel (HSS) in combination with Normal Graded Concrete (NGC) is common in Bangladesh's construction sector, given the mechanical advantages of high strength steel. So, there is a growing interest in examining the bond behavior between high strength steel and normal strength concrete, which is particularly crucial in the context of Bangladesh's rapidly developing construction industry. The findings from such studies can have significant implications for designing more efficient, cost-effective, and sustainable structures, ultimately contributing to the overall development of the country's built environment.

Project duration: July 2023 - June 2025

Key Researcher: Md. Mehedi Hasan, Research Engineer

35

An experimental study on the feasibility of fine-crushed stone dust as a partial replacement for cement in concrete

Background

Concrete is one of the most widely used construction materials in the world, owing to its exceptional durability, strength, and versatility. However, the production of conventional concrete is associated with several environmental and economic challenges, primarily stemming from the substantial use of cement as a binding agent. Cement manufacturing is an energy-intensive process and a significant contributor to carbon dioxide emissions, making it a major concern in the context of sustainability and climate change. This has led to a growing interest in exploring alternative materials that can reduce the reliance on cement while maintaining or even enhancing the performance of concrete.One promising solution to address these concerns is the incorporation of supplementary cementitious materials (SCMs) as partial replacements for cement. SCMs, such as fly ash, slag, and silica fume, have been successfully utilized in concrete mix designs to improve various properties, reduce the carbon footprint, and extend the lifespan of structures. These materials are often waste products from other industries, making them sustainable alternatives to traditional cement.Fine-crushed stone dust, also known as quarry dust or stone fines, is another potential SCM with great promise in the construction industry. Fine-crushed stone dust is generated during the crushing of quarried stone to produce aggregates for construction. Typically, it is considered a waste product and disposed of in landfills, contributing to environmental concerns. However, researchers have recognized its potential as a valuable resource in concrete production.

Project duration: July 2023 - July 2025

Key Researcher: Rubel Rana, Research Engineer

36

National housing demand and projection analysis for SDG 2030

Background

The research gap in the field of housing demand and policy in Bangladesh is a critical issue that requires immediate attention. Despite the country's rapid urbanization and population growth, there is a significant dearth of comprehensive and up-to-date studies that can inform effective housing policies. Current research often lacks granularity and fails to consider the unique socioeconomic, cultural, and geographic factors that influence housing demand and the effectiveness of government policies. Furthermore, the existing literature predominantly focuses on the urban areas, while rural housing issues remain largely unexplored. To address this research gap, future studies should adopt a multidisciplinary approach, incorporating insights from economics, sociology, urban planning, and public policy to provide a holistic understanding of the complex dynamics at play in the housing sector of Bangladesh. Such research can contribute to the formulation of more targeted and equitable housing policies to meet the diverse needs of the population and alleviate the housing crisis in the country. This information gap extends to critical aspects such as income levels, family size, geographic distribution, and the specific housing needs of different socio-economic groups. Consequently, the lack of housing demand information perpetuates inadequate and unequal housing solutions, further contributing to substandard living conditions, homelessness, and overcrowding in both urban and rural areas of Bangladesh. Resolving this information deficit is crucial for informed policy-making and ensuring a more equitable and sustainable housing scenario in the country.

Project duration: November 2023 - June 2025

Key Researcher: Monjur Parvez Senior Research Architect (A.C), HBRI

37

Performance of concrete block aggregates RC beam & column with other conventional aggregates RC beam under two-point loading

Background

The construction sector in Bangladesh is evolving, with the increasing use of blocks instead of traditional bricks, driven by government support. Traditionally, brick aggregates are commonly sourced and used for various purposes instead of stone aggregates.

Now, we need to investigate the potential applications of block aggregates specifically in the construction of beams and subsequently test the strength of these beams. This will provide insights into the feasibility and performance of block aggregates in structural applications.

Project duration: July 2023 - July 2025

Key Researcher: Syed Ahmed Tasnim, Research Engineer

38

Experimental study on soft story effect of a single bay RC frame due to seismic load

Background

In Bangladesh, many high-rise buildings have open ground story with masonry infill in the upper story. They are mainly constructed to accommodate parking, reception lobbies and other commercial spaces. Conventional practice is to design these buildings as moment resisting frame building considering masonry infill as non-structural element. Thus contribution of infill in the total structural response is neglected. In reality, masonry infill interacts with frame members and makes the structure stiffer than the bare frame except ground story. The open ground story building has stiffness irregularity as visualized during an earthquake. In this research, computational study has been conducted to monitor the response of the open ground story column subjected to seismic action. The variable parameters in the investigation are number of bays, number of spans, and percentage of infill. 3D models are generated namely as bare frame model and soft story frame model. The masonry infill is converted to equivalent diagonal strut within the panel. Conventional static linear analysis is carried out for basic loading (i.e., Dead load, Live load and Earthquake load) and load combination is done as per BNBC 2020. Pushover analysis is performed to get nonlinear static response of the models.

Project duration: July 2023 - June 2025

Key Researcher: Md. Ibnul Warah, Research Engineer

39

Development of sand cement block by incorporating plastic waste

Background

In building construction, concrete block is a versatile material used in the construction industry, consisting of a mixture of cement, sand, and optionally fine aggregates with water. The cost of these materials, which make up the concrete block, is expensive. So we should use a renewable natural resource that causes negative impacts on the environment. Plastics are one of the materials present in our everyday lives, which have many chemical and hazardous substances that affect human health and the surrounding environment. This study investigated the utilization of two type of waste plastic (Polyethylene Terephthalate (PET) and Low Density Polyethylene (LDPE) used for bags manufacture) as a fibers and fine aggregates (powder) in sand concrete. Various volume fractions of sand (10%,20%,30% and 40%) were substituted by the same volume of plastic aggregates, and various amount of plastic fibers (0.5%, 1%, 1.5%,2%) were introduced by volume in sand concrete mixes. The physical and mechanical properties of the composites produced was studied. The results showed that the use of plastic waste as partial replacement of sand contributes to reduce the bulk density, decrease the air content, causing a increase in compressive and flexural strength and especially for 10% and 20% of replacement. In addition, the reinforcement of the cementing matrix with plastic fibers induced a clear improvement of the tensile strength. This study insures that reusing waste plastic in sand concrete gives a positive approach to reduce the cost of materials and solve some environmental problems.

Project duration: July 2023 - June 2025

Key Researcher: Rezwanul Haque, Research Officer

40

Eco-friendly particle board development from water hyacinth

Background

The objective of this study is to use water hyacinth collected from various areas to make particle board with each individual item as well as a combination of these in various ratios. Water hyacinth particle board is therefore one of such material which may be considered a potential substitutes for woods-based board products. Since most of the previous studies done are by making use of wooden fiber, the present work focuses on finding the properties of the board by using of different fiber. The physical and mechanical properties of these board will be determined by using a series of tests like moisture content test, water absorption properties, thickness swelling, tensile test, compressive test and flexural strength. The results will be then compared with the IS standards.

Project duration: July 2023 – December 2024

Key Researcher: Bivor Chandra Ray, Research Officer, Building material division

41

Mycelium block- sustainable solution for future

Background

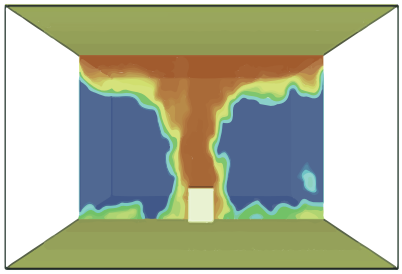
A team of four (core researcher, research assistant, one semi skilled technician, one skilled labour) is made for the research work to run smoothly. This team has received a day long theoritical and practical training for the culture of mushroom.The mushroom strain chosen for this research work is Oyester Mushroom, scientific name Pleurotus ostreatus. This particular strain of mushroom is chosen considering the environmental condition and cost effectiveness. At the same time the culture procedure of this strain is particularly easy in bulk condition.

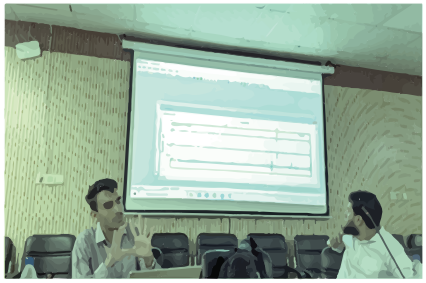
Among various approaches monolithic myco structure have been selected after literature studies for its numerous advantages. The research is on progress in small at lab for trial and error. Several strains are using for getting better result of mycellium and several approaches are taking in consideratin to get the desired result for further steps.

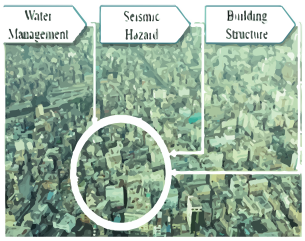
Project duration: July 2023-June 2024

Key Researcher: Mariam Hossain Nupur , Research Officer

Ongoing Activities







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