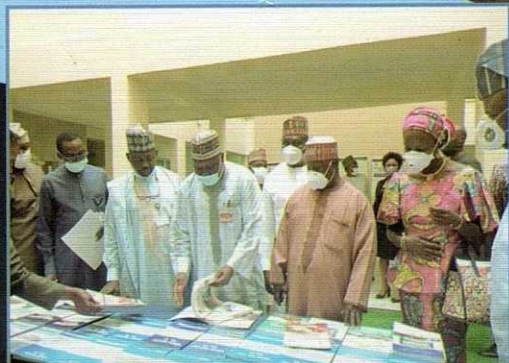




# NBRRI IN 2020

Vol. 7, No. 2 January 2021

*Prof.*  
**SAMSON  
DUNA**  
CONFIRMED AS DG/CEO  
**NBRRI**



HOUSE COMMITTEE ON  
SCIENCE AND TECHNOLOGY  
visits NBRRI Administrative Headquarters Abuja

## TEAM

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## NBRRI

(VISION, MISSION & CORE VALUES)  
BUILDING CAPACITY & SETTING THE  
PACE IN INDIGENOUS CONSTRUCTION  
TECHNOLOGY DEVELOPMENT

### VISION

To evolve and use a comprehensive and integrated approach in capacity building and investment promotion so as to foster the application of environment-friendly and energy-efficient innovation, construction materials, manufacturing technologies and cost-effective building and road construction practices, which will enhance job-creation, wealth generation and poverty reduction as well as nurture the emergence of vibrant, knowledge-based and highly competitive indigenous construction companies capable of meeting global standards

### MISSION

Integrate R & B, Capacity building and robust extension services in which technology innovation and knowledge-based practices in the fields of building road and engineering materials will be used to provide adequate and affordable housing and road infrastructure as well as increased economic Empowerment.

### CORE VALUES

- Professionalism
- Resourcefulness
- Commitment and Integrity
- Innovativeness

*Published by Nigeria Building and Road  
Research Institute (NBRRI)*

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*All Correspondence to the Director General / CEO*

# Editorial

I welcome you all to the 2020 Special Edition of NBRI'S Newsletter. This edition can be tagged 'Covid-Edition'. It is a combination of the First, Second, Third and Fourth Quarter activities of 2020 which was hindered by the sudden emergence of the Global Pandemic of Covid-19 which brought about a halt to all activities in the institute and the world at large.

You will all agree with me that the journey so far hasn't been easy as 2020 has proven to be one of its kind.

Despite all the challenges and disappointments, we are all still standing strong and tall. We have quite a handful of news information that will enable you know that NBRI has accomplished so much in the year 2020 despite the pandemic outbreak.

This Newsletter is well loaded with educative, informative and other activities ranging from the visit of the House of Representatives' Committee on Science and Technology to NBRI on oversight functions to other courtesy visits and presentations.

It is worth noting that the Acting DG/CEO has also been conferred with the prestigious FELLOWSHIP title of the Nigerian Society of Engineers based on his competence and acceptance to societal and developmental responsibilities. In the same line of great achievement for the institute, Prof. Samson Duna proved himself worthy of a good leader and thereby appointed to be the fifth Director-General/Chief Executive Officer of NBRI. We join

our voice with that of the Ministry and the Nation at large to say a big congratulation to a good leader.

Prof. Samson Duna had an interactive meeting with Kano Zonal Office and he also paid a courtesy visit to the South-South Zonal Office.

Courtesy visits were made to the Institute by the Executives of the committee on Anti-drugs and substance abuse of the National Association of Nigerian Students; Executives of the Nigerian Association of Engineering Craftsman; the Honourable commissioner of Gombe Ministry of Science, Technology and Innovation; Executives of the Association of Housing Corporations of Nigeria; and the Management of Artisans Skills Empowerment Initiative. Tertiary Education Trust Fund also paid a courtesy call to NBRI's Laboratory Complex in Ota; And Kano State considers NBRI for Consultancy Services as stated by the State Commissioner of works.

Also captured is an article on NBRI's curbing of quackery in the building industry through Artisan Centres and Workshops and Mass Housing through the use of NBRI Stabilized Earth Blocks. The Road Research department organized a workshop on Investigation of Road Pavement Failures. Other workshops were organized by the Finance and Account Department, the Admin Department and the Library Unit of the Institute.

The social diary is well packaged and included in this edition.

This is an interesting package of amazing articles and you are invited to come along and read on!

**Makava Daniel**

Editor-in-Chief

## BRIEF ON SCIENCE LABORATORY TECHNOLOGY RESEARCH DEPARTMENT



- \* The Science Laboratory and Technology Research Department main focus centres on developing both hardware and software tools that support Research and Development activities as it pertains to the Building and Road sector.
- \* It is uniquely and strategically saddled with the responsibility to articulate ideas aimed at developing, acquiring and maintaining facilities for capacity building, effective and efficient research and development activities geared towards actualizing Institutional mandates.

### VISION AND MISSION OF SLTRD

#### Vision

- \* To evolve a robust research infrastructural base that can adequately provide the much needed laboratory and applied sciences/mathematics support services to the entire research community in NBRRI, for efficient and timely delivery of Institutional mandates.

#### Mission

- \* To offer services such as installation, maintenance, repairs and development of test equipment, laboratory tests of building, road and engineering material samples, and interpretation of test results.
- \* To design and develop scientific, mathematical and computer models/application that supports relevant R&D tasks in the Building and Road construction industry.

## MANDATE OF SLTRD

- \* To House critical facilities that supports various R & D tasks in the field of building, road and engineering materials research.
- \* To conduct necessary laboratory tests of material samples and offers assistance in interpretation of tests results when needed.
- \* To assist in product development and process technology evaluation for improved performance.
- \* To design and develop relevant equipment for various R&D tasks.
- \* To provide technical inputs in the purchase of new R&D equipment.
- \* To assist in the installation, calibration, maintenance, troubleshooting and repairs of R & D equipment.
- \* To design and develop scientific, mathematical and computer models/applications that support relevant R&D tasks in the Building and Road construction industry.

### DIVISION AND SECTION

*The Department has the following Divisions with their accompanying Sections:*

#### **Laboratory Infrastructure Division**

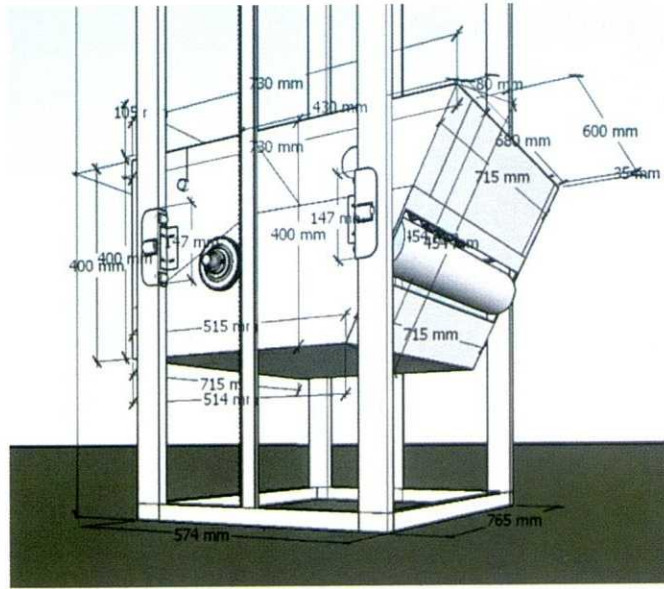
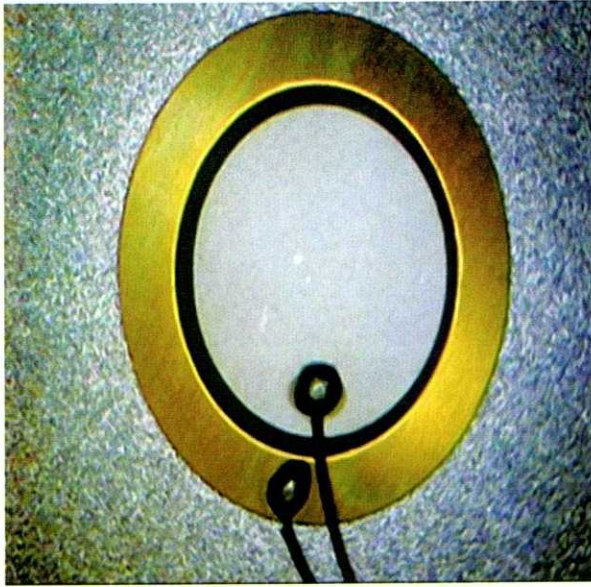
- \* Analytical and Process Laboratory Section
- \* Instrumentation Laboratory Section

#### **Technology Research Division**

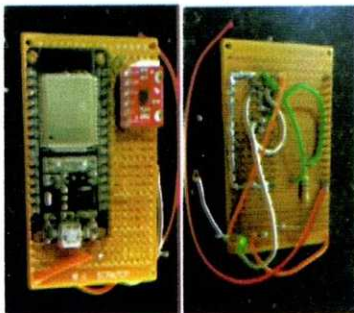
- \* Instrumentation Research Section
- \* Modelling and Software Development Section



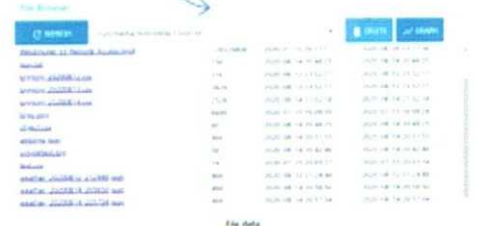
# SOME ON-GOING RESEARCH WORK AND ACHIEVEMENTS



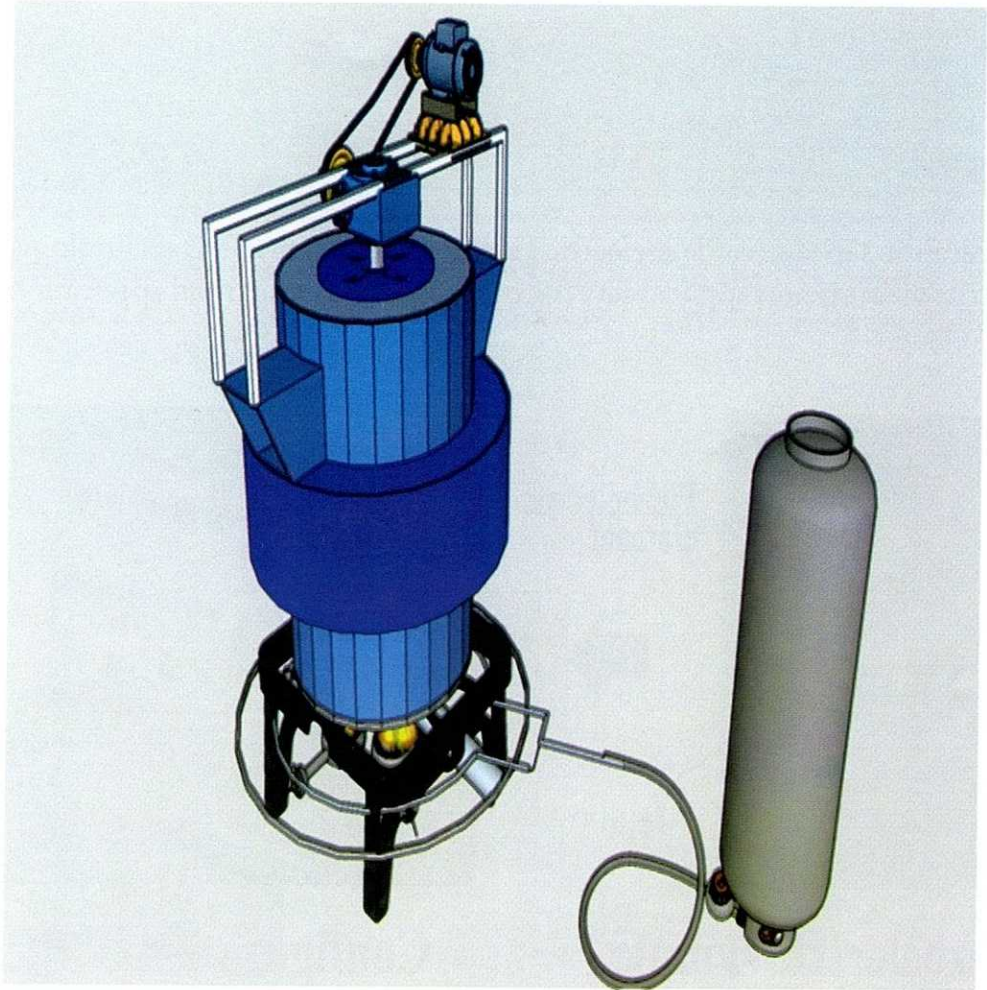
Local Server



DAQ Module

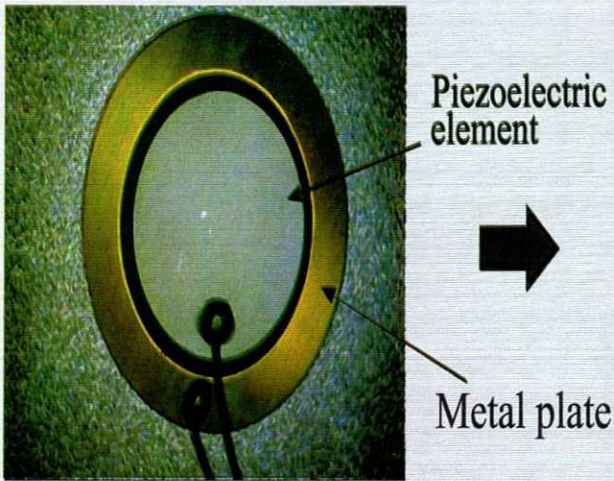


Saved files

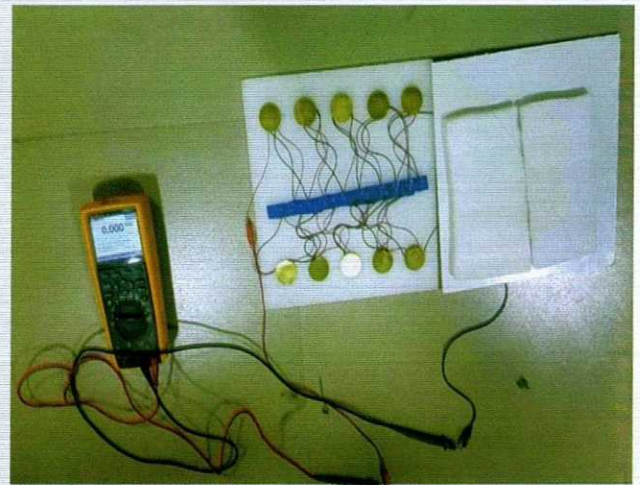


# EVALUATING THE POTENTIAL OF PIEZOELECTRIC ENERGY HARVESTER (PEH) IN NIGERIA

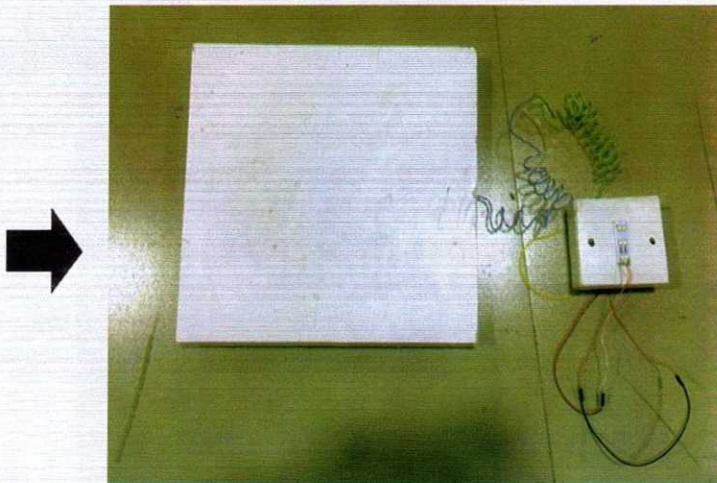
The study aimed to assess Piezoelectric Energy Harvester (PEH) technology in order to establish its viability and applicability for energy harvesting in road application.



**Piezoelectric sample**



**Configuration of the PEH**



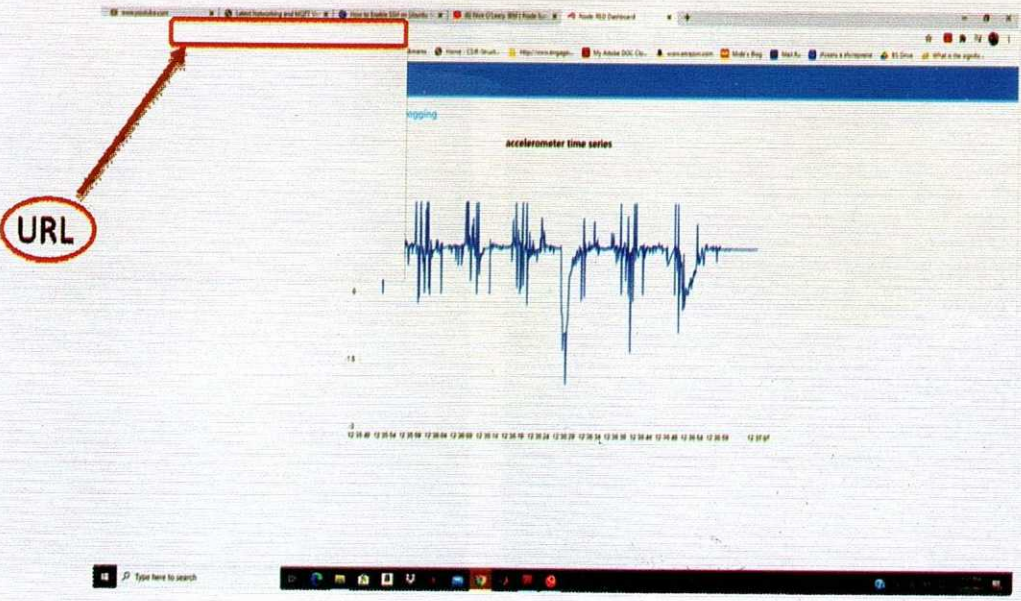
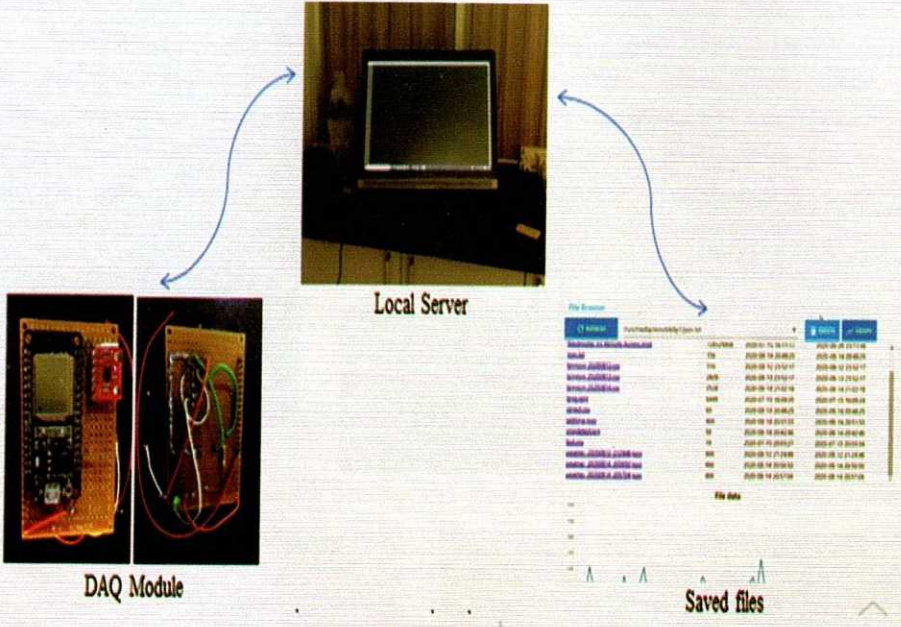
**PEH panel powering LED load**

**EXPECTED OUTCOME:** To establish the viability of using piezoelectric material as an alternative energy source for road illumination, Structural Health Monitoring devices and so on, in Nigeria.

# STRUCTURAL HEALTH MONITORING DEVICE FOR BRIDGES IN NIGERIA

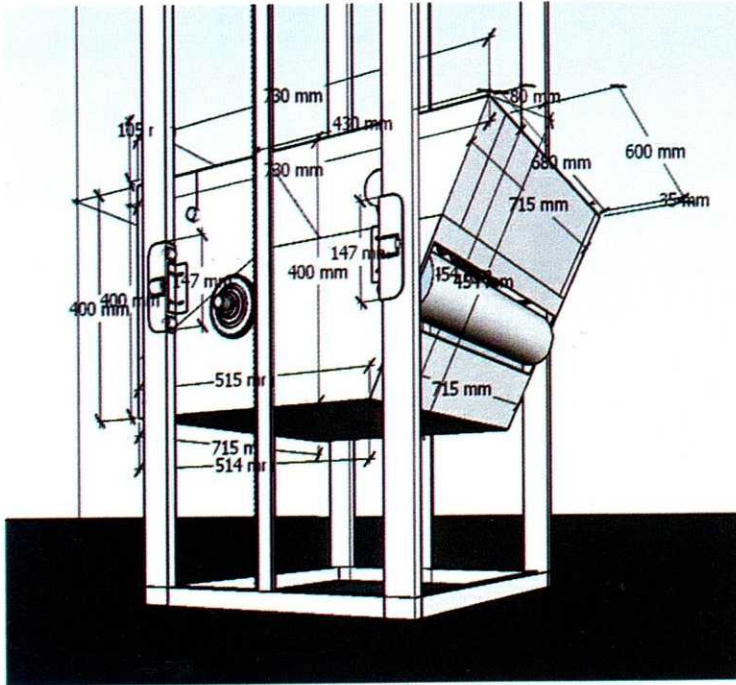
Project Brief: Failures of bridges abound in Nigeria within the last century demands rapid development of Structural Health Monitoring (SHM) in order to study failure trends of new and existing bridges while proffering suitable solutions.

The study aimed at developing a cost-effective monitoring system for real-time structural health monitoring of Bridges in Nigeria.

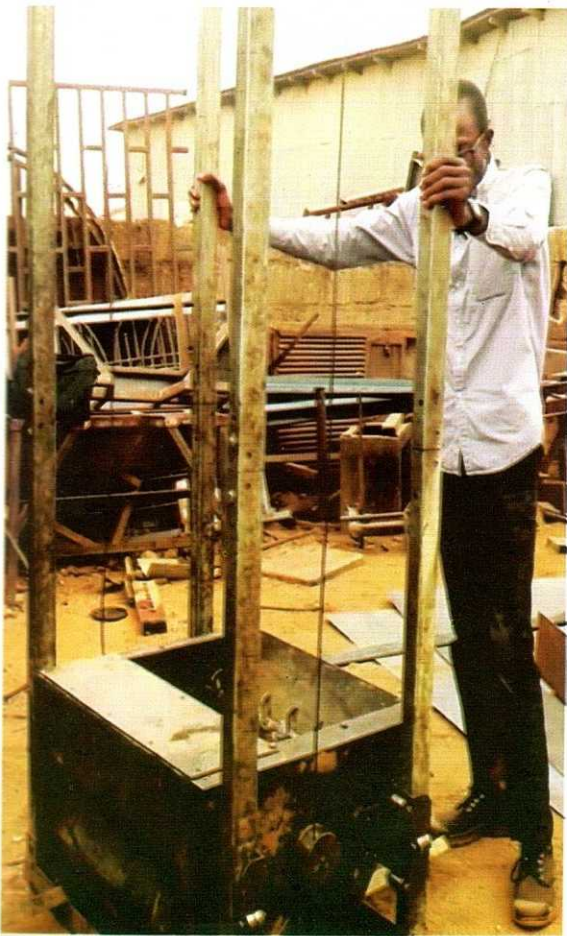
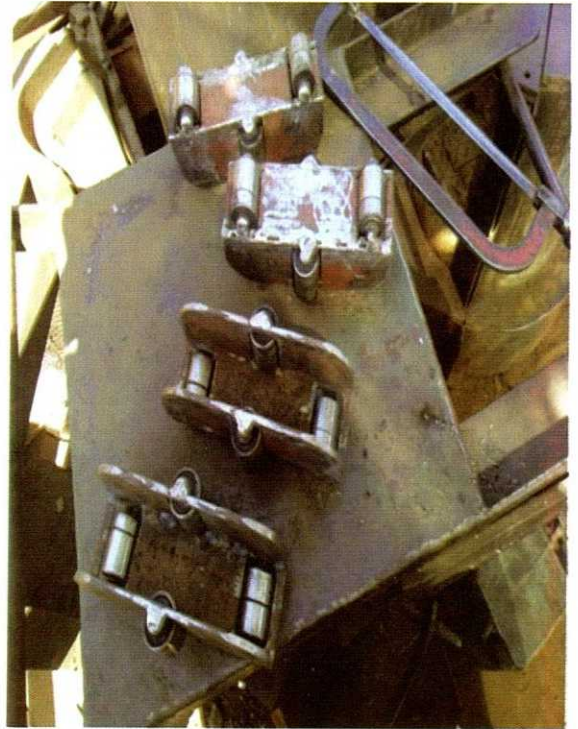


# AUTOMATION IN CONSTRUCTION

The project seeks to automate the wall plastering process through the design and fabrication of wall plastering machines. The control mechanism is designed to account for uneven walls.

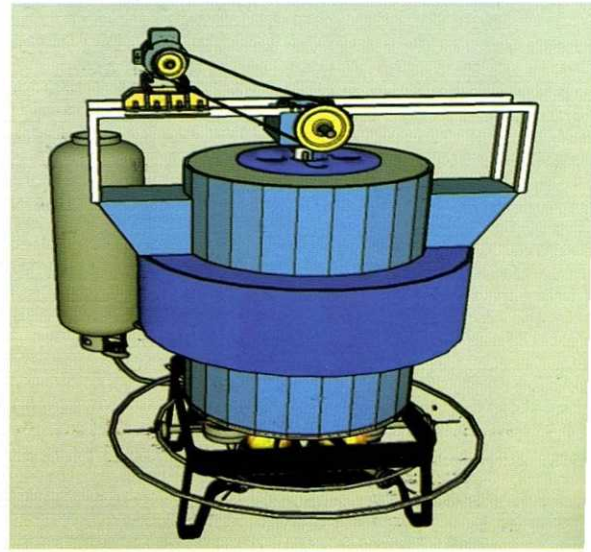
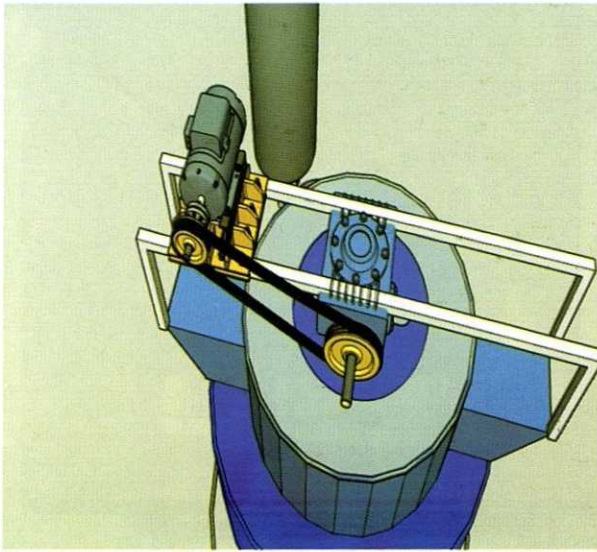


# AUTOMATION IN CONSTRUCTION

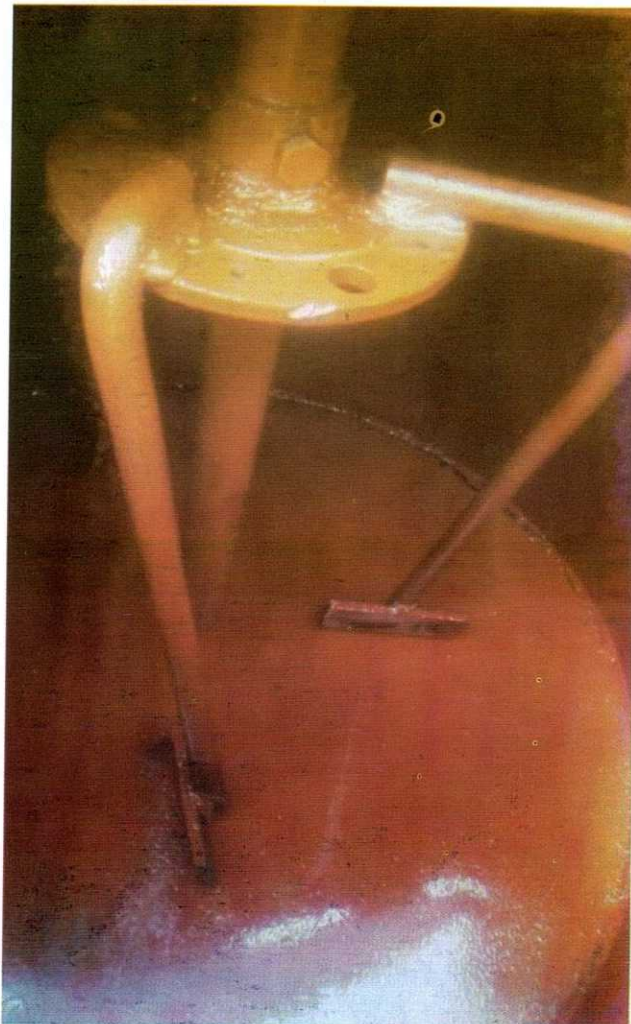


## DEVELOPMENT OF PLASTIC MELTER DENSIFIER AND EXTRUDER MACHINE IN THE PRODUCTION OF PLASTIC BLOCKS

Project Brief: Re-use of waste plastics in several forms for the development of construction material. It includes the design and fabrication of a plastic melter densifier and extruder machine that are used in the production of plastic blocks, roofing tiles paving stones and so on.

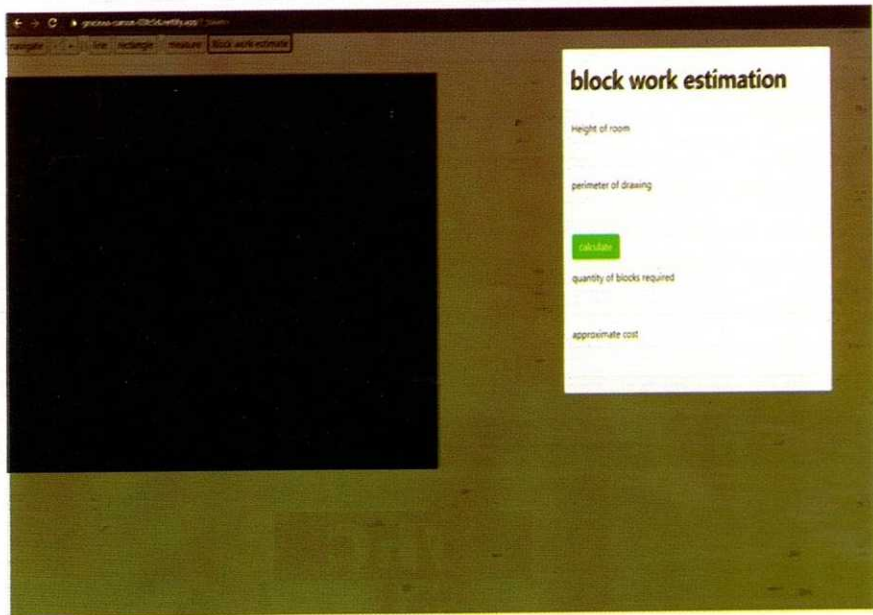
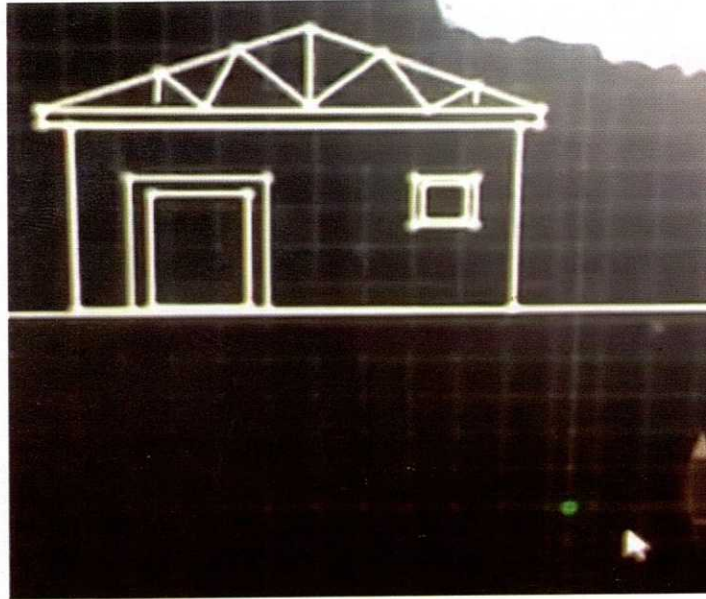
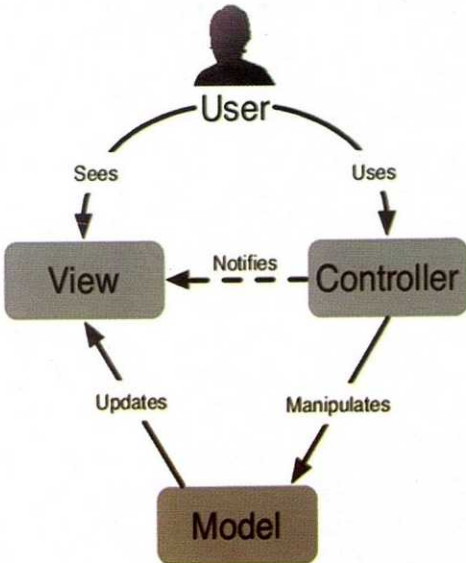


# DEVELOPMENT OF PLASTIC MELTER DENSIFIER AND EXTRUDER MACHINE IN THE PRODUCTION OF PLASTIC BLOCKS



# DEVELOPMENT OF ONLINE APPLICATION FOR ESTIMATING BUILDING COST IN NIGERIA

The study seeks to develop an online interactive application that will estimate the quantity of blocks and associated cost based on a simple 2D sketch.



current work is hosted at: <https://gracious-carson-03fc5d.netlify.app/>

# ACTING DG VISITS KANO ZONAL OFFICE



The Acting DG/CEO of NBRRI, Professor Samson Duna has stated that only staff who possess the requisite experience and found to be hardworking would henceforth be involved in the supervisions and activities of the projects from zonal offices.

He stated this on Friday, January 17th, 2020, when he paid a 2-day visit (which ended with an interactive meeting) with staff of the Kano Zonal Office at the office's premises in Kano. Prof. Duna was accompanied to the visit to Kano by Head of Internal Audit, Mr. Boniface Ajah and Mr. Sunday Dika, as well as the advance team of the DG, involving Adamu Yakubu, Hassan Yusuf and Ahmad Ibrahim Yusha'u.

The acting DG expressed his joy over the conduct and dedication of staff in Kano office and commended the Kano zonal head for his committed service in discharging the responsibilities shouldered upon him. He further stressed that as projects being undertaken by NBBRI continue to litter the nooks and crannies of the country, there is the need for good, qualified and productive staff to be engaged in the supervision of all projects.

Prof Duna also urged them to come up with research that identifies problems in the building and road industry and proffer solutions to such problems. He stated that although lack of funding of research was a problem that the institute has been trying to resolve, he assured them that all hands are on deck to make sure that research funding will be made available.

He challenged the zonal head to work towards increasing the publicity of NBBRI in the state, such that there would be special attention around the institute.

In his welcome address, the Zonal Head, Mr. Moyi M. Zayyan, thanked the Ag. DG/CEO for the construction of a model laboratory at the Kano zonal office, which has been fully equipped with modern machines and furniture for research officers' use.



## STUDENTS ANTI-DRUGS AND SUBSTANCE ABUSE COMMITTEE VISIT NBRRI



The Executives of the committee on Anti-drugs and Substance Abuse of the National Association of Nigerian Students paid a courtesy visit to the Nigerian Building and Road Research Institute on 22nd January 2020. The delegation was received by the Acting DG and top members of management.

The mission of the committee is to selflessly serve others by helping to instill value in the youth and by providing other ways to prepare them in making ethical choices about drugs that will help them achieve their potentials.

The Secretary General, Comrade Ibrahim Yarima stated that the association is the largest student movement in Africa and they have a core mandate of carrying out various campaigns in order to reduce drug abuse. He mentioned that the aim of the visit is to identify areas of partnership between the committee and the institute and to also seek for financial support from the institute.

The Acting DG welcomed them and he stated that he was impressed with the work the committee was doing. He promised his full support to the student movement as he is keen on supporting youths because they are the future of the Nigerian society.

Mrs. Jude Iloma the Deputy Director of Administration encouraged them to increase their effort in curbing drug abuse in order to reduce the rate of depression and suicide among young people in the society.

The DG appreciated them for coming and asked that God grant them journey mercies to their various destinations.



Delegates and Management Staff



DG and Leader of the delegates



DG presenting NBRII publication to the delegates



Cross section photograph at the meeting



DG & Director of Admin

## NIGERIAN ASSOCIATION OF ENGINEERING CRAFTSMAN VISITS NBRI



The Executives of the Nigerian Association of Engineering Craftsmen were at the headquarters of the Nigerian Building and Road Research Institute on a courtesy visit on the 22nd of January, 2020. On hand to receive the delegation was the Acting DG/CEO of the institute and some top management staff.

Speaking at the call, the National President Gyang Tanko appreciated the DG and members of staff present and he elaborated on the aim of the visit which was to seek collaboration for training of artisans, execution of institute projects and calling of non-registered members of the institute to register with their association in order to help achieve the mandate of the institute. He mentioned that he was impressed with the institute's innovations and offered to assist the institute in achieving her mandate. He also said that they could be invited to present papers during conferences.

Responding to the delegation, the Acting DG welcomed them to the institute. He stated that one of the major reasons for building collapse in Nigeria is the incompetence of the artisans and he promised to encourage all technical staff to be members of their association.

Engr. Hassan, the Director of Procurement stated that the actual development of building and road construction is in the hands of the craftsmen and so the craftsmen are a major part of the building process. He said that the collaboration is a welcomed idea because a lot can be achieved through the partnership.

The DG welcomed the idea of partnership between the Association and the Institute. He promised to offer his full support and also invited the team for its upcoming international annual conference.



## GOMBE STATE COMMISSIONER OF SCIENCE, TECHNOLOGY AND INNOVATION, VISITS NBRI

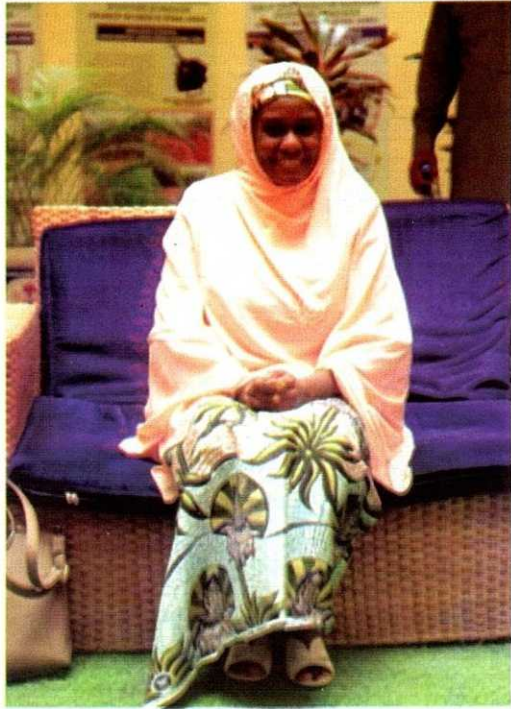


The benefits of Science, Technology and Innovation in the Nigerian society cannot be overemphasized and it is in light of this that the Honourable Commissioner of Science, Technology and Innovation in Gombe State paid a courtesy call to the Acting Director General/ Chief Executive Officer of Nigerian Building and Road Research Institute (NBRI), Engr. Prof. Samson Duna on the 19th of February, 2020 at the Administrative Headquarters in Abuja. The delegation was received by the Ag. DG/CEO and some top management staff of the Institute.

Speaking at a brief but remarkable session, Engr. Prof. Samson Duna, the Ag. DG gave a brief summary of what NBRI's achievements which includes constituency project supervision, consultancy services, equipped laboratory services, movable house projects, several researches on building and road construction, establishment of Pozzolana plants in Ota and Bokkos, capacity building, weekly research seminars, infrastructural development, improvement of the properties of laterite, N-Power collaboration, amongst others. He also stated that land had been approved by Gombe State government for NBRI projects in the State.

In response, the Honourable Commissioner said that NBRI has no doubt made remarkable impacts in the Construction and Engineering Industry and National Development at large. It is in this light that they would like to partner with the Institute by patronizing NBRI Journals and also through the use of the movable house projects for RUGA Settlement and movable schools in Gombe State, establishment of Artisan Call Center, amongst others.

In his response, the Ag. DG expressed his excitement about the collaboration and he promised his continuous support to Gombe State. He also invited them for the annual International Conference and also for any upcoming training the institute might be organizing. He wished them well and thanked them for coming.



## KANO STATE CONSIDERS NBRRI FOR CONSULTANCY SERVICES - COMMISSIONER OF WORKS

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# NBRI CURBING QUACKERY IN THE BUILDING INDUSTRY THROUGH ARTISAN CENTRES

....ENGR. PROF. SAMSON DUNA

Incidents of building collapse and the attendant loss of valuable lives and property have continued to occur across the nation in spite of concerted efforts by stakeholders in the industry to curb the ugly trend. This is worrisome. The number of precious lives lost, devastating injuries, economic loss, and the trauma of an equally homeless population cannot be quantified. The figures are disturbingly staggering, placing the need on relevant authorities to act, and timely too.



## RECENT INCIDENTS

Before the end of September 2020, more than nine incidents were reported in Lagos, Abia and Kano. Barely two months to end the 2019 year, the nation had been shocked by reports of double building collapse incidents in Lagos where lives and properties were lost. This was followed by another incident two weeks later in Jos, Plateau State, precisely, October 27th, where scores of persons narrowly escaped death from a two-storey building collapse at Butcher Lane Dilimi, Jos North Local Government Area. An eye witness who identified himself as Nura said the building fell at about 3pm without any prompting, neither was it raining nor was there any vibration that could have felled the building. About four months earlier, a similar incident occurred in the area when a three-storey building hosting a pharmacy shop collapsed killing the owner of the building, his wives and several others. These are just a few mentioned.

## EXPERTS REVEAL QUACKERY AS POSSIBLE CAUSE

Meanwhile, experts have attributed the use of substandard materials, sharp practices such as the activities of quacks to have been responsible for the incidences of building collapse in the country. Some of the major causes are said to include bad design, fire, lack of proper supervision, faulty construction and alteration of approved drawings etc. Nigeria's foremost commercial capital, Lagos, with its large population, has the highest ratio of building collapse cases compared to other states in the nation. To stem the tide, experts have advocated the Nigerian Building Code implementation to overhaul the construction industry.

## NBRI TO THE RESCUE

The Nigerian Building and Roads Research Institute (NBRI) was established to conduct integrated applied research and development (R&D) in building, roads and construction. The mandate was later in 1993 expanded to include R&D into all aspects of engineering material related to the construction industry.

In 2018, the former Director-General of NBRI, Engr. Prof. Danladi Matawal, at the Annual National Conference and Exhibition of the Nigerian Institution of Metallurgical, Mining and Materials Engineers in Abuja released staggering figures of building collapse incidences which occurred in the country between 2014 and 2016. The figures stated that building collapse incidents claimed 199 lives within a three-year span alone. Prof. Matawal said that research effort by NBRI revealed that poor supervision and the use of inferior materials in the construction of buildings were responsible for the high incidence of building collapse in the country.

In 2011, the number of building collapses that took place in Nigeria alarmingly followed the pattern of previous years with Lagos, recording the highest number of incidences involving buildings under construction and some already in existence for years. In Abuja and across the nation, buildings collapsed at Jabi, Garki, Mpape, Mararaba and, early in 2012, at Gwarinpa Estate. Also, major building collapses were recorded in Enugu, where three buildings fell within on

month, while Ibadan, Sokoto and Yenagoa also witnessed collapses. Overall, 2012 witnessed 33 collapses in Lagos alone and 22 in Abuja. NBRI also said the worst cases were those of the Synagogue Church on September 12, 2014, where 115 people were killed and several injured, and the Lekki Garden construction on March 18, 2016, with 35 dead and several injured.

Again, between February and May, 2019, no fewer than 29 persons were reportedly killed and 76 sustained injuries from 13 building collapse incidents across the country. Experts say tons of structural failures occur yearly that are hardly reported or attract public notice because there is yet no up-to-date official statistics on building collapse. Minister of Science and Technology, Dr. Ogbonaya Onu at an event recently, stressed the resolve of the federal government to drive development in the country. He said: "For us in the Federal Ministry of Science and Technology, we will continue to encourage the ideals that promote development. The FMST is in the driving seat to make our development rest on our indigenous science, technology and innovation.

"NBRI's Acting Director-General, Prof Samson Duna has said that the issue of building collapse is an area that concerns NBRI's mandate. To this effect, he said that NBRI has developed artisan guidelines. "They are good but not technically inclined. We have been able to develop Trade Manual from this, for carpenters, plumbers etc", he said. He said NBRI also wants to create a call center for artisans. "It's part of our vision that each state will have an Artisan Call Center. If you want to build your own property and you are looking for plumbers and so on, you don't have to go to their houses, rather, there will be a credible place where you can locate them easily around town. It's a center that will have all the facilities in place", he said.

In further efforts, NBRI recently organized a training/workshop on 'Sustainable Building Design and Material Specification', in view of the low performance levels of buildings in the country. The aim was to assess the issues and challenges facing the building sustainability in Nigeria and provide the panacea to mitigate the challenges, and to strengthen the capacity of professionals in the building sector in the area of design, material specification and construction techniques considering the climatic demand (condition) and local content.

A communique issued at the end of the first workshop/training identified that most building failures arise from substandard materials and poor supervision rather than design.

The communique highlighted other issues as follows:

\*Flexural failures are identified as the major cause of building collapse.

\*On engineering design, there is the need for modified adoption of Euro code or BS standards in accordance with localized parameters for Nigeria.

\*Building collapse investigation team must comprise all building professionals in the construction industry as agreed by the Committee of Registers of the industry's regulatory bodies.

\*Lack of adherence to building standard is a major source of worry in attaining building construction sustainability.

\*The need to prosecute quacks both in the cities and suburbs by the Committee of Registrars of the seven professional bodies in the construction industry.

\*Proposed building finishing materials should be checked at building approval stage and inspected at and cleared at the finishing stage, and NBRI, ARCON and Development Controls, both federal and state levels should work on this.

As a drive to curbing the menace of quackery in the building sector, NBRI has been embarking on training for artisans across the nation. The recent training session for artisans in the South-Eastern part of the country was divided into two parts, theoretical and practical. The first trainer, Engineer Gidado informed the trainees that several projects have been executed using NBRI bricks. This has several advantages over the conventional blocks in terms of good appearance, thermal comfort, fire resistant, bullet proof, easy to use, high compressive strength and cost reduction.

Industry watchers believe that quackery can be tackled headlong with appropriate legislation such as the NBRI Act amendment which is currently before the National Assembly.

**Compiled by Miriam Humbe, Peoples Daily.**

## ROAD RESEARCH DEPARTMENT OF NBRRI ORGANIZES A ONE-DAY WORKSHOP ON INVESTIGATION OF ROAD PAVEMENT FAILURES

The Nigerian Building and Road Research Institute (NBRRI), is not sleeping when it comes to finding solutions to the issue of Road Pavement Failures in Nigeria.

This necessitated the one-day workshop organized by NBRRI on 2nd September, 2021 in collaboration with reputable stakeholders in the road sector like FRSC, RSDY, FERMA & ETC.

The investigation takes a look at the Abuja – Lokoja Federal Highway and Benue – Enugu Federal Highway. The workshop is to brainstorm on the workflow to investigate the selected routes and come up with solutions that will be implemented.

Declaring the workshop open, the Ag. DG/CEO of NBRRI Prof. Samson Duna stated that the workshop is timely and necessary because this research project is of National Importance. He then encouraged all participants to contribute meaningfully and revert back to the various agencies the Communique of the workshop and outcome of the project for further action to be taking by the Federal Government in this regard.

### PAVEMENT FAILURES AND MAINTENANCE

Road maintenance is the most important component of the road system. It involves assessment of road condition, diagnosis of the problems and adopting the most appropriate maintenance step. Even if the highway is well designed, they may require maintenance to its less design life. Various types of failures occur in the pavement which ranges from minor to major distresses.

### GENERAL CAUSES OF PAVEMENT FAILURE

**1. POOR SOIL:** - It is the most common problem in the pavement design. The most common soil problem in the Southeast is a high-water table. If not accounted for at the time of construction, a high-water table will erode the soil and eventually lead to pavement failure.

**2. INFERIOR MATERIAL QUALITY:** - If the material laid on the ground is not good enough, it will lead to severe defects and failures.

**3. IMPROPER GEOMETRY:** - Due to improper geometry of road, lot of factors may occur which keeps the pavement deformed.

**4. OVERLOADING OF VEHICLES:** - A vehicle is said to be heavy loaded when it is loaded more than its carrying capacity. Acc. to IRC, the max. wheel load for standard is 80 KN. Due to heavy movement of vehicles or overloaded vehicles or increase traffic volume, severe distresses take place.

**5. ENVIRONMENTAL FACTORS:** - It includes heavy rainfall, soil erosion, high water table, snow and frost action etc.

**6. INADEQUATE DRAINAGE:** - Due to inadequate drainage resulting in stagnation of water on the subgrade which could be the main reason for pavement failure in future.

### FLEXIBLE PAVEMENT FAILURES

- i. Surface deformation Corrugations  
Shoving Settlement and Upheaval
- ii. Cracking Fatigue Cracking Transverse Cracking Longitudinal Cracking Edge Cracking
- iii. Disintegration Potholes Patches iv. Surface Raveling Bleeding



## FLEXIBLE PAVEMENT FAILURES

**ALLIGATOR CRACKS:** - known as map cracking or crocodile cracking or Fatigue failure (since it appears similar as alligator skin so it is called as alligator cracks). The failure can be due to weakness in the surface, base or sub grade; a surface or base that is too thin; poor drainage or the combination of all three. The main reason of this type of failure is the repetitive application of heavy movement of traffic.

### ALLIGATOR CRACKS

**BLOCK CRACKS:** - Block cracks look like large interconnected rectangles (roughly). Generally, it is caused by shrinkage of the asphalt pavement due to an inability of asphalt binder to expand and contract with temperature cycles. This can be because the mix was mixed and placed too dry. The size of each rectangle may vary from one foot by one foot to ten foot by ten foot. It spreads over a larger area of ground.

**LONGITUDINAL CRACKS:** - Longitudinal cracks are individual and run parallel to the centerline. This distress can be considered as either a structural or an environmental distress. These can be a result of pavement fatigue, reflective cracking, and/or poor joint construction.

**TRANSVERSE CRACKS:** - Transverse cracks are single cracks perpendicular to the pavement's centerline or laydown direction. Transverse cracks can be caused by reflective cracks from an underlying layer, daily temperature cycles, and poor construction due to improper operation of the paver.

### PATCH

A patch is an area or portion of pavement greater than 0.1 sq.m that has been removed or replaced with new material to repair the existing pavement. A patch is considered a defect no matter how well it is performing (a patched area or adjacent area usually does not perform as well as an original pavement section). These defects can be improved by taking the measurement in  $\text{ft}^2$  or  $\text{m}^2$ . and filling it with a fresh layer of the bitumen.

### POTHOLES

These are small, bowl-shaped depressions in the pavement surface that penetrate all the way through the asphalt layer down to the base course. In the Western United States, these are known as chuckhole. The pothole can expand to several feet in width and later it leads to the formation of patches. They don't develop too much in depth. The vehicle tires are damaged due to large potholes. In cold temperatures, the water trapped in the pothole will carry out the freezing and thawing action that leads to additional stresses and crack propagation. Potholes are also repaired by patchwork.

**EDGE CRACKING AND SHOULDER DROP OFF:** - Edge Cracks travel along the inside edge of a pavement surface within one or two feet. The most common cause for this type of crack is poor drainage conditions and lack of support at the pavement edge. As a result, underlying base materials settle and become weakened. Heavy vegetation along the pavement edge and heavy traffic can also be the instigator of shoulder drop off. It can be improved by rooting out existing vegetation and by fixing the drainage problem. It can be removed by filling the cracks or seal the



**SLIPPAGE CRACKS:** - Slippage cracks are crescent-shaped or horse shoe shaped cracks or tears in the surface layer. It is the asphalt where the new material has slipped over the underlying course. It is caused by a lack of bonding between layers. Acceleration, deceleration and sudden brakes on the road are leads to slippage cracks. Mostly these cracks show on intersections due to stopping.

**WEATHERING AND RAVELING:** - It is the adhesion between the asphalt cement and aggregate. Deformation starts with breaking up of fine aggregates in small pieces and leaves small patches over the pavement. Later the larger aggregates break and leave rough surface. There are many reasons why raveling can occur, but one common cause is placing asphalt too late in the season. Traffic loading is also one of the reasons of raveling.

**RUTTING:** - The depression formed in the surface is called the rutting. This is formed in the wheel path surface along the way of road. This depression will make the other sides of the wheel to undergo uplift. It is caused by insufficient pavement thickness, lack of compaction of the asphalt, stone base or soil, weak asphalt mixes; or moisture infiltration. If rutting is minor or if it has stabilized, the depressions can be filled and overlaid. If the deformations are severe, the rutted area should be removed and replaced with suitable material.

**CORRUGATION:** - Transverse undulations appear at regular intervals due to the unstable surface course caused by stop- and-go traffic. The only difference between rutting and corrugation is the direction of distress undulations. In rutting, distresses take place along the direction of the road and in corrugation, distresses appear in the transverse direction. Where the traffic starts and stops, these distresses are observed.

**BLEEDING:** - Excess bituminous binder occurring on the pavement surface causes bleeding. Bleeding causes a shiny, glass-like, reflective surface that may be tacky to the touch. Usually found in the wheel paths.

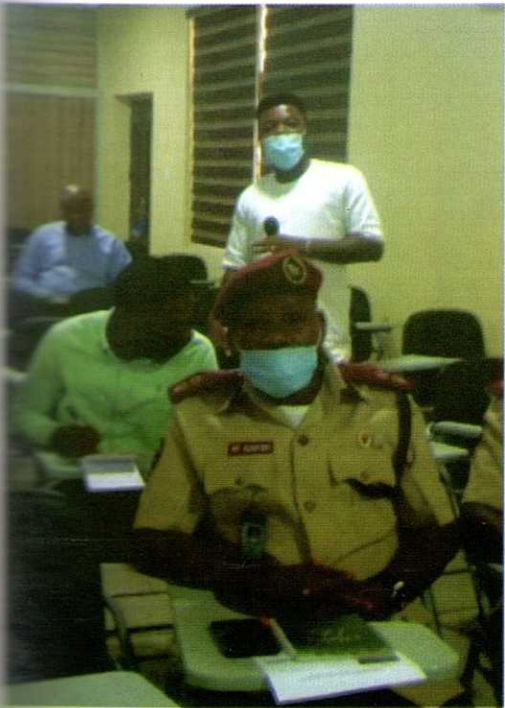
**FROST HEAVING OR SWELLING:** - Upheaval is a localized upward movement or the formation of upward bulge in a pavement due to swelling of the subgrade. This can be due to expansive soils that swell due to moisture or frost heave (ice under the pavement). It can be recovered by full depth patch.

## MAINTENANCE OF FAILURES

**1. BITUMINOUS SURFACE TREATMENT:** - Also known as a seal coat or chip seal, is a thin protective wearing surface that is applied to a pavement or base course. It is provided to protect the underlying pavements, improved skid resistances etc. A BS offers preventive maintenance from the effects of sun and water, both of which may deteriorate the pavement structure. Seal coat

**2. ASPHALT OVERLAY:** - Asphalt overlay is a paving method of applying a new layer of asphalt to a deteriorating surface. An asphalt overlay project will use the existing layer as a base for the new asphalt pavement. Some asphalt surfaces with severe damage like rutting, potholes, large cracks, and expansions will need to be milled before an overlay is applied. ("milling" is the removal of the top layer of asphalt that has been taken on cracks, raveling or other kind of deformation.

**3. SLURRY SEALS, CRACK SEALS:** - Slurry seals is a homogenous mixture of emulsified asphalt, water, well-graded fine aggregate and mineral filler that has a creamy fluid-like appearance when applied. Slurry seals are used to fill existing pavement surface defects as either a preparatory treatment for other maintenance treatments or as a wearing course. Crack seal products are used to fill individual pavement cracks. It is used to prevent entry of water or other non-compressible substances such as sand, dirt, rocks or weeds. Crack sealant is typically used on early-stage longitudinal cracks, transverse cracks, reflection cracks and block cracks. Crack filler material is typically some form of rubberized asphalt or sand slurry.



# A GREAT ICON BOWS OUT OF SERVICE



*Handing over of the outgoing Cordinator to the incoming Cordinator of NLC, Ota*

The atmosphere was filled with songs of praise and encomium as staff of the Nigerian Building and Road Research Institute (NBRRI) at the National Laboratory Complex (NLC), Ota, Ogun State celebrated a great man of Honour, Engr. Dr. Francis Aitsebaomo as he bowed out of the Civil Service with joy after he meritoriously reached the 65years of age criteria for research officers in the service.

For more than three decades of service to the Nigerian Building & Road Research Institute, Francis Omokekhai Aitsebaomo has served in various notable capacities and has attained the position of a Director. Till his retirement, he served as the Director of Road Research Department (RRD) and also the Coordinator of NBRRI's National Laboratory Complex (NLC), Ota, Ogun State.

Aitsebaomo was born on 2nd September, 1955 in Kumasi, Ghana. He hails from Fugar, Etsako

Central Local Government Area of E State. He joined the services of Nigerian Building and Road Research Institute 37 years ago, precisely on December 1983 as a Technical Officer. He was later converted to Research Officer following the acquisition of requisite qualification in 2002. He acquired Diploma in Civil Engineering in 1981 and a Post Graduate Diploma in Soil & Water Engineering in 1995. He obtained his M.Sc, Environmental Geotechnics in 2001 and Ph.D in Environmental Geotechnics in 2008.

Aitsebaomo was appointed as Coordinator, NLC, Ota in 2011. He was promoted to the post of a Director of Road Research Department in 2015. He has several journal publications, technical reports, conference proceedings to his credit. He is happily married with children.

Dr. Aitsebaomo was the longest serving member of staff of the Institute before his retirement having served for the last 37years.

In his appreciation speech on the day of the celebration which took place on 2nd of September, 2021 at the Prof. D. S. Matawal Hall at NLC, Ota, Dr. Francis Aitsebaomo expressed his gratefulness to have served as Director of Road Research Department and Coordinator of NLC Ota. He thanked the members of staff for all their support over the years and the confidence imposed in him as Coordinator of National Laboratory Complex, Ota over 8years.

He gave a brief history of how he rose from the rank of a Technical Officer to the rank of a Director thereby becoming the Coordinator of NLC, Ota. He said he has been in NLC since inception and was grateful to have served under all the Directors General/CEOs of NBRRI till date.

Highlight of the occasion was the official handing over to Dr. Charles Osadebe as the new Director of Road Research Department and Coordinator of NLC, Ota.

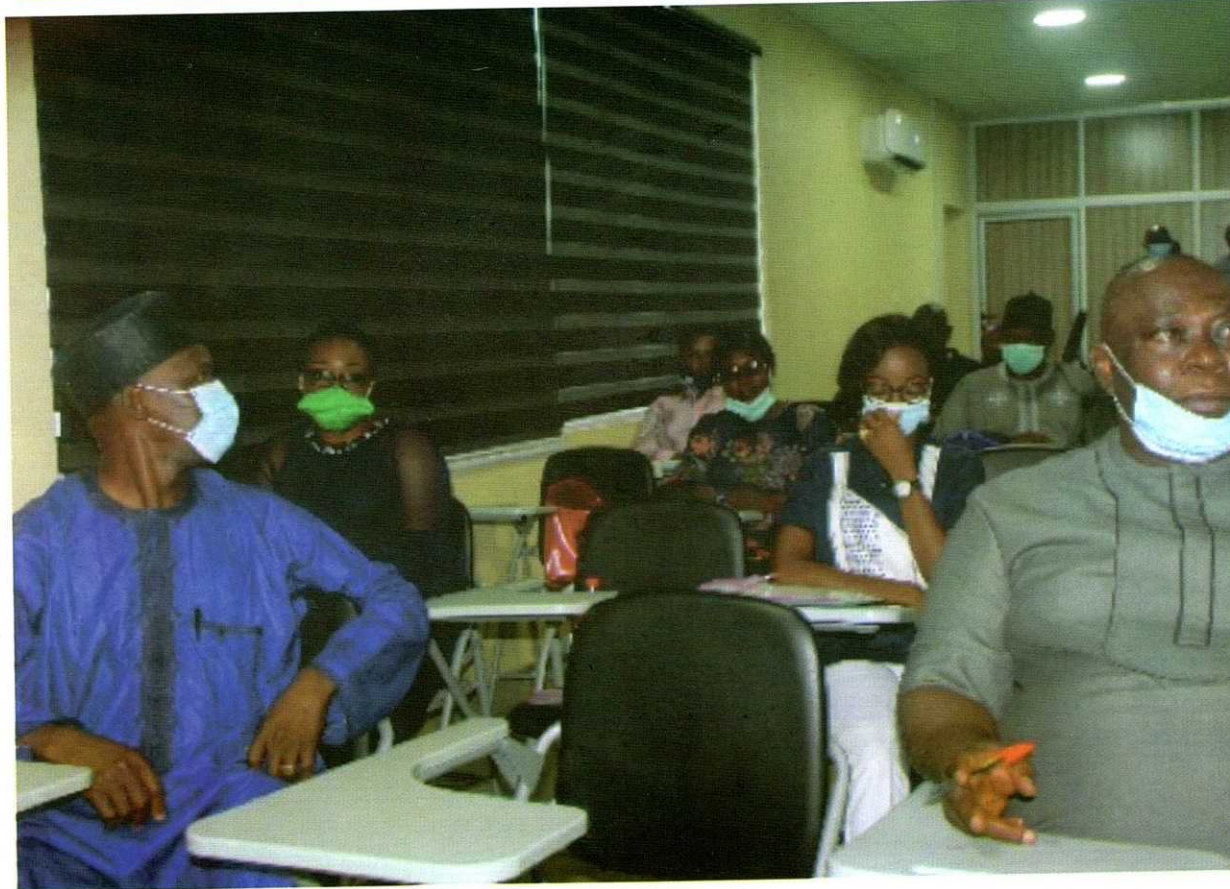
In his acceptance speech, Dr Charles C. Osadebe thanked him and wished him all the best in his endeavours. He then used this means to encouraged Technical Officers to take a leaf from Dr. Francis Aitsebaomo to strive and not just remain on grade level but

aspire for the highest level in the Institute.

Dr. Charles C. Osadebe and other staff who spoke at the occasion gave him words of advice as he journeys to the outside world and wished him a happy birthday as that day was his 65th birthday.



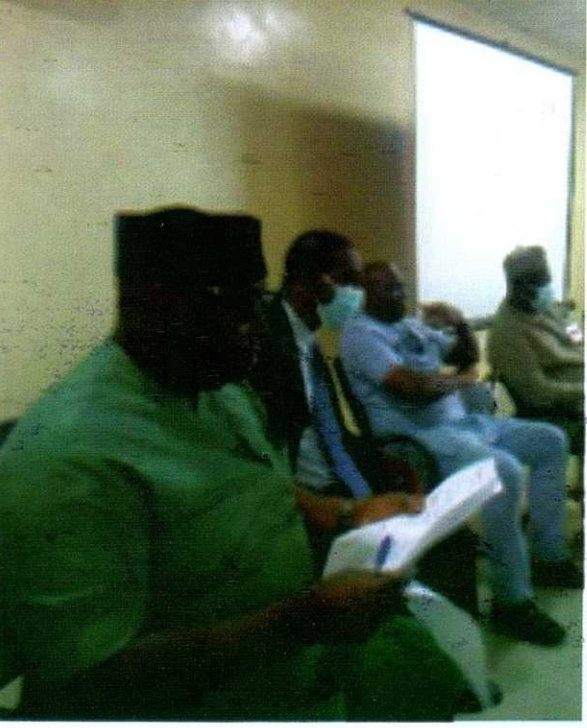
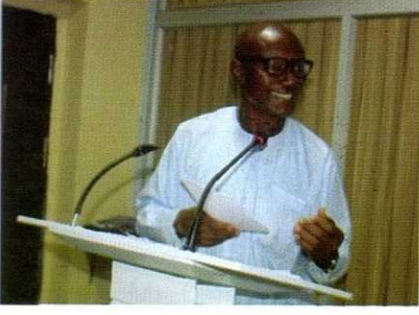
## FINANCE AND ACCOUNT DEPARTMENT OF THE NIGERIAN BUILDING AND ROAD RESEARCH INSTITUTE (NBRI) HOLDS A 2-DAY WORKSHOP



*Cross section of the participant at the workshop*

Proper accounting brings financial accuracy in any organization. The training of staff for effective delivery stands as the top priority of the Institute. This was made known by Ag. Director-General/Chief Executive Officer of NBRI, Prof. Samson Duna at the opening ceremony of the 2-day workshop with the theme "Preparation of IPSAS Accrual Compendium Financial Statements" organized by the Institute for staff of the Finance and Accounting Department of NBRI on 14th September, 2020 at the Institute's head office, Abuja.

In his opening remarks, Prof. Duna encouraged all participants to take the workshop seriously and enjoined the resource persons drawn from the Office of the Accountant General of the Federation to render all necessary assistance to the participants, in order to gain the skills and required knowledge on accounting. He also stated that the major problem faced in the Civil Service today in relation to staff output is lack of constant training for staff. Reiterating that "you cannot employ a staff without training him/her for effective performance". To curb this situation and to uplift the output quality of staff, the need for staff training should be one of the topmost priorities of any institution especially in Research Institutes. He concluded by encouraging all participants to positively gain experience from the workshop so as to add value to the society.

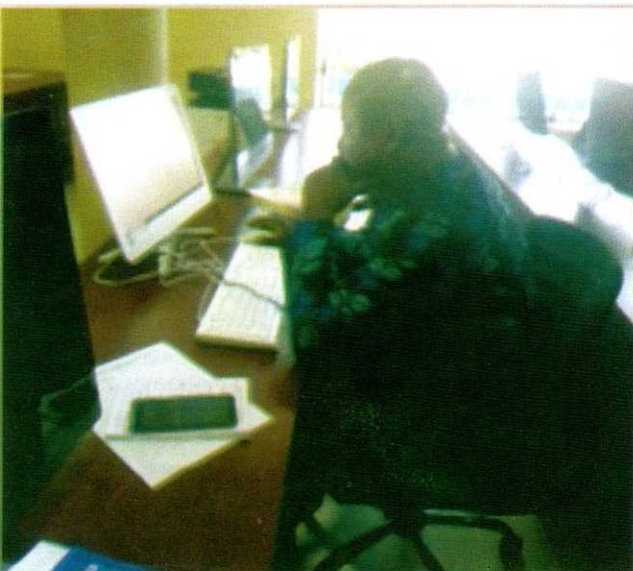
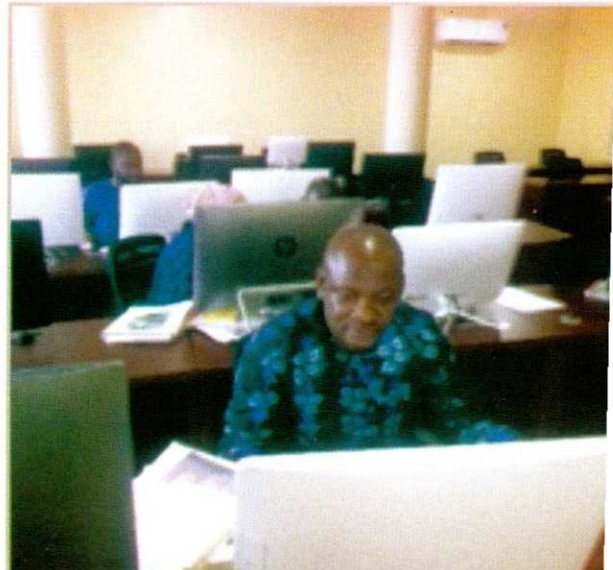


## LIBRARY UNIT STAFF UNDERGO TRAINING

It was a filled day of knowledge and upgrade for staff of the Library Unit of the Planning and Information Technology Department of the Nigerian Building and Road Research Institute (NBRI) as they began an intensive 2-days training on Library Management Software (LIBPLUS).

The whole idea is to automate the entire library process from manual to electronic. The Electronic Library System provides the latest functions as well as allowing books to be displayed on screen as if they were printed books. The system makes advances in retrieving books and papers. The system enables the user to display multiple books on a single screen and skip from one part describing an idea to a link describing the same idea within another book. It enables the user also to reference dictionaries and thesauruses simultaneously, check any unknown terms, attach notes and tags to various positions in a book, translate original text, and output text as voice data.

NBRI, through the leadership of the present Ag. Director-General/Chief Executive Officer, Prof. Samson Duna, is set to compete with world standard in all areas of Research and Development.



## THE REGISTRY UNIT OF THE NIGERIAN BUILDING AND ROAD RESEARCH INSTITUTE ON AN E-REGISTRY TRAINING

Nigerian Building and Road Research Institute (NBRI) is set to embark on a first-class digitalization of all her documentations and processes as the Staff of Registry Unit of the Institute had an intensive training on E-Registry on 23rd September, 2020.

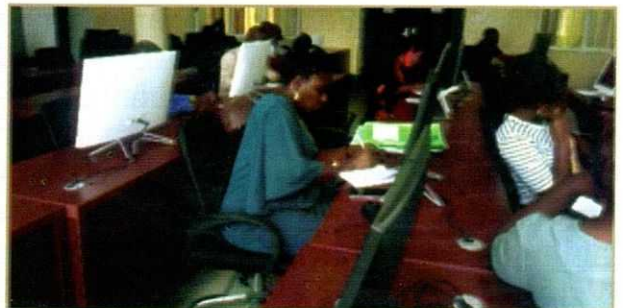
Declaring the training open, the Ag. Director-General/Chief Executive Officer of NBRI, Prof. Samson Duna appreciated all Heads of Department for their positive initiatives and professional input towards moving the Institute to greater levels. He then encouraged all participants to dedicate their time and concentrate on the training.

Speaking at the opening of the training, the Head of Planning and Information Technology Department of the Institute, Mr. Kehinde Arabi explained that the training is the first phase of the three stages of training on the digitalization procedure, as well as handling of files and documents in the Registry. He said that other phases of training will involve the Ag. Director-General, all Heads of Departments, and other staff in the Admin and Personnel Department.

He also added that the benefits of an E-registry include increased productivity, cost efficiency. Easy to access, enhanced security, enhanced information preservation, saves space and time, and it encourages digital transformation. And that with this training he was positive that digitalization will be profitable to the institute and Nigeria as a whole.

Also, the Director of Admin and Personnel Department, Mrs. Ifeoma Jude-Iloma appreciated the Ag. DG/CEO for his numerous contributions in showcasing the Institute to the world through the introduction of positive programmes. She also called on participants to buckle up in complimenting these efforts.

The participants were glad and they appreciated the DG for the opportunity to participate in the training and they promised that they will do their possible best for the benefit of the institute.



## **STATE OF THE NATION'S HOUSING ADDRESS PRESENTED BY THE COUNCIL'S PRESIDENT/CHAIRMAN ASSOCIATION OF HOUSING CORPORATIONS OF NIGERIA (AHCN), DR. VICTOR ONUKWUGHA DURING WORLD HABITAT DAY 2020 CELEBRATION ON MONDAY 5TH OCTOBER, 2020**

### **INTRODUCTION**

Today, World Habitat Day will certainly be a day of mixed feelings for many stakeholders in the housing sector. For me, it is a day full of emotions watching helplessly the most vulnerable of our people living under unhygienic environment with overcrowding and slums settlement while many are without shelter. As we are all aware, a day like this is set aside to reflect on the state of our towns and cities, and on the basic right of all to adequate shelter. Ironically, the theme of this year's World Habitat Day 2020 is "Housing for All: A Better Urban Future, and the Global Observance". It is an opportunity for us as a nation to reassess our activities and remind us that we all have great roles, power and the responsibility to shape the future of our cities and towns to impact positively on the housing needs of our people.



*Dr. Victor Onukwugha*

It is no longer news that in the recent past, housing challenges in Nigeria seem to have defied all solutions. It is also not a controversy that various housing policies put in place to address these challenges have virtually failed to resolve the myriad of problems facing the sector. The effects of these challenges are manifested in increasing housing shortages and acute problem of housing availability, accessibility and affordability especially in our urban centres. These problems were further compounded with the nation's recent economic recession. While we were crawling out of the economic recession with the hope of finding lasting solutions to the nation's housing challenges, the entire world was jolted by the outbreak of Covid-19 which resulted in global pandemic.

There is no doubt that opportunities are abound in the construction and housing sector and home ownership still remains and constitutes the priority and major need for the people. However, our past efforts as a nation to position housing as veritable tool for economic growth and empowerment with these opportunities left much to be desired.

### **OVERVIEW OF HOUSING AS GOVERNMENT SOCIAL RESPONSIBILITY**

Social housing all over the world is essentially driven by government and it is seen as the responsibility of government to the governed. Our governments both at the Federal and State levels have done very little over the years to respond to social housing and address increasing housing deficit. Although there is no accurate statistic of housing shortage in Nigeria, the usual quoted estimated figure has been in the range of about 2 million housing shortages. It is however worrisome that efforts put in place over the years to address these deficits have not really yielded notable and anticipated results.

The poor implementation and non-execution of public housing programmes both

the Federal and State levels based on the overall framework of the housing policy have continued to create problem for the sector. Social housing is virtually unattractive to our governments as there are no profound commitments to affordable housing especially at the Federal level. Land accessibility and availability are cumbersome with high cost of titling and documentation couple with slow processing timeline which discourages investment into the sector. Slum settlements are springing up in our major cities without notable government's plan of resettlement or redevelopment.

The local building materials sector is facing a major setback and there is no commitment to enhance development activities and researches of local building materials. The sector is majorly dependent on the use of foreign components and importation of materials at the expense of local production. Local manufacturers are therefore struggling to exist amidst notable apathy of the general public to make use of their end products. Few building materials manufacturers that defy all odds are not supported with enabling environment and incentives to embark on mass production as poor infrastructures discourage sustenance of vibrant local building materials production which in effect result in high cost of materials.

Our mortgage market is crawling when we have a vibrant platform that can create unhindered access to affordable mortgage as well as exit point for developers who invested in housing. The prevailing mortgage rate outside 6% NHF mortgage range between 15% and 25% which is not assisting affordability and accessibility of housing. The capital markets that would have provided needed succour to the mortgage market is under-developed as adequate safeguards to securitization of mortgage-backed assets are yet to be put in place which discourage most prospective lenders from exposing their credit and liquidity asset to risk. The challenge is further aggravated with inappropriate under-digitization of land registries and transaction as well as non-foreclosure laws in most of the states.

According to the recent World Bank report, Nigeria requires at least 700,000 units per year to keep up with the growing population and urban migration arising from the housing deficit. The global pandemic arising from outbreak of covid-19 further exposed the non-performance of the sector as the GDP from construction decreased to ₦513,692.43 million in the second quarter of 2020 from ₦682,791.74 million in the first quarter of 2020. The GDP growth as at August 2020 stood at negative -6.1% and is projected to slide down further to -3.0% by December 2020.

## **REFLECTION ON HOUSING PROVISION IN THE STATES**

Reflecting on the theme of this year World Habitat Day 2020 "Housing for All: A Better Urban Future, and the Global Observance"; can we boldly boast of a better urban future and housing for all our people? Before we can conclude on what the future of housing provision holds for our people, it will be necessary to assess the housing situation and how our state governments have responded to the provision of affordable housing within the last two years in the states.

Statutorily, housing corporations, which were located in all states of the federation, were created as government agencies to execute public housing programme and undertake the development of housing estates by acquiring, developing, holding, managing, selling, leasing or letting any property movable or immovable in their respective states on behalf of their state governments based on the formulated housing policy and programmes of each state within the overall framework of the national housing policy. It is on record that the pedigrees of these housing corporations in the past were most evident in all the state capitals especially when states were newly created until recently when these statutory

responsibilities were ignorantly being usurped gradually from them by some state governors and saddle the ministries with the responsibilities or sometimes directly unburdened the Governor's office. Even the Federal Housing Authority with pedigrees of mass housing successes was not spared in the acrimony of usurpation of these statutory roles which led to the neglect of most of these housing agencies.

With the combined efforts of all stakeholders in addressing housing deficit both at federal and state levels, how did state housing agencies perform within the last ten years?

**ABIA STATE**

The state housing agency, the Abia State Housing and Property Development Corporation has in the last three years concentrated in site and services of land in its estates was able to develop only 50 units at its Industrial Market Housing Estate Umuahia in the phase of the 3,000 units proposed for the estate. The corporation has proposed 200 units in Unity Garden estate Awa which is yet to take off. The last estate developed by the corporation was done over ten years ago at Ehimiri Housing Estate Umuahia with over 300 units.

**ADAMAWA STATE**

The Adamawa State Urban Planning and Development Authority has not been doing so much in provision of housing for the state in the last five years and has indeed become redundant. Until recently when Family Homes Limited signed an agreement with state government to fund development of 2,000 housing units in Yola and another 1,000 housing units in Malkohi.

**AKWA IBOM STATE**

The state housing agency, the Akwa Ibom Property and Investment Co. Ltd has not done anything in the last two years outside the 1st phase of the Civil Servant estate completed in 2018. The organization is currently talking to the Family Homes Funds for 3,000 units of houses at Odiokitam in Itu local government council.

**ANAMBRA STATE**

Apart from the ongoing 500 Housing Units at NkwelleEzunaka, Oyi L.G.A which is under completion, the Anambra State Housing Development Corporation in the last two years concentrated on site and service with two of its budding estates at Green Valley Estate and Liberation estate known as Diaspora village. The Awka Millennium Smart City (Phase 1) Housing Estate which is under construction at about 30% is being handled by the ministry without involvement of the corporation.

**BAUCHI STATE**

Bauchi state has over fifteen years merged its housing corporation with the ministry and has not done anything spectacular in affordable housing though some projects have been executed with some private developers in recent past. The Family Homes Funds are the partner with the state to build 2,500 housing units in the state. The state does not have any state housing agency since the merger of the corporation years back.

**BAYELSA STATE**

Apart from the ongoing 192 units at Okaka in Yenagoa which started recently and is

units already completed out of the 700 units in Agbura Housing estate, the Bayelsa State Housing and Property Development Authority has not really made much in response to the housing demand in the state in the last two years before the advent of the current administration that is committed to providing affordable housing for the people of the state. Other housing development in the state like the Judges Estate project at Opolo and the Ayama Housing Estate which were at different stages of completion were executed by the state ministry of housing

### **BENUE STATE**

Benue State Investment & Property Company Ltd, the state housing agency has done really much in the last three years except for the ongoing 20 housing units in Makurdi. The other housing estates in the state is the proposed ANDP Housing Projects, 5,000 Units Housing Project in Agatu which is to be undertaken directly by the state government but yet to commence. The Nigerian Army Post Service Housing Development Limited (PHDL) also has 221 units housing estate in Otukpo LGA of Benue state with Federal Housing Estate, phase 2, in Makurdi.

### **BORNO STATE**

In Borno State, the invasion of Boko Haram has done devastating damage to the development of housing in the state. In the past 10 years, despite continued incursion of the insurgents in the state which hampered construction activities, the Borno State Housing Corporation has risen to the challenges of housing shortage arising from the Boko Haram attack in the state. The Corporation has developed 2,778 residential houses comprising 1, 2, 3 and 4 bedrooms in different part of Maiduguri metropolis which has been sold out under owner occupier programme between ₦750,000 and ₦3,000,000.00. Another 426 units of 2, 3 and 5 bedrooms were also developed in Zumlghe estate and Ugghe CBN Quarters which were rented out while a total of 1,550 has been completed but occupied by Internally Displaced Persons in Maiduguri. This is apart from 500 units comprising of 100 units of one bedroom and 400 units of 2 bedrooms under construction along Kano Road in Maiduguri. The current Governor, Governor Babagana Zulum has been pre-occupied with the resettling and rehabilitation of the displaced people in the state and the Family Home Funds is collaborating with the Borno State Government through the Ministry of Reconstruction and Rehabilitation in the development of the 1,700 urban housing and 3,200 rural housing. Few days ago, while coming back from the commissioning of the 1,000 housing units for the Internally Displaced Persons Estate in Bama, the Governor's convoy was attacked by the Boko Haram and about 30 people were killed in the attack which further put the provision in the region at low ebbs. Apart from what Family Home Funds is doing with the state government, North East Development Commission is also planning 10,000 housing units of 1,000 units across 10 LGA with pilot scheme at Ngwom, in Mafa Local Government Area.

### **CROSS RIVER STATE**

The Cross River State Property Development & Investment. Ltd, the housing agency of the state did not garner enough support to develop any housing units in the last two years. There are three ministries namely Ministry of Social Housing, Ministry of Housing and Ministry of New City Development that are also involve in housing development in the state. The government however was able to complete directly 52 units of 2-bedroom housing for Internally Displaced Persons' housing estate in Bakassi through the Ministry of Social Housing. Meanwhile the state housing agency, CROSPIL is concluding arrangements with the FMBN for the development of 200 housing units while working

on preliminary arrangement with REDAN for development of 150 housing units in the state.

**DELTA STATE**

The Delta State Development & Property Authority was able to develop the Heights Estate in Asaba for outright sales, while Family Home Funds Limited Housing Estate in Issele-Azagba in Asaba consist of 650 units comprising 1- and 2-bedroom semi-detached bungalows in Delta State while the Ministry is working on the Shelter Africa 150 housing units in Ibuza, behind Asaba Airport with a proposal for 1,000 housing units in Inillah Estate.

**EBONYI STATE**

The Ebonyi State Housing Development Corporation has not done anything for the past 10 years outside the new 100 housing units to be funded by Federal Mortgage Bank of Nigeria in Abakaliki.

**EDO STATE**

The Edo Development and Property Agency is currently developing at its Emot Gardens, Ikpoba-Okha LGA, a 1,800 units gated community. The agency is in partnership with Mixta Africa Limited and the Edo State government to build approximately 2,000 housing units.

**EKITI STATE**

In Ekiti, only 20 units were developed at Afao Housing estates in the last two years. Another 231 units is being proposed for development in Ado Ekiti. Federal Housing Estate, Ado Ekiti, 70 housing units.

**ENUGU STATE**

Apart from the 20 units developed in Rangers Estate, the Enugu State Development and Housing Corporation has engaged in site and services in the last three years. Among estates that is almost built up by the allottees are WTC Estate, Fand view Estate and Cita Estate all in Enugu.

**GOMBE STATE**

The state housing agency, the Gombe State Housing Corporation has not done anything in the last four years. Since its name was changed from Gombe State Investment and Property Development Corporation in 2015, the board of the corporation is yet to be constituted.

**IMO STATE**

Outside Sites and Services, the state housing agency has not embarked on any new estate in the last two years.

**JIGAWA STATE**

The Jigawa State Housing Authority was able to complete 164 housing units in the last three years and it was supported by the state government.

**KADUNA STATE**

The state housing agency, the Kaduna State Development and Property Corporation

Limited has not embarked on any physical development in the last three years. However, the Ministry of Housing in the state has developed about 200 housing units. The Kaduna State however has passed the Mortgage Foreclosure into laws which has created enabling environment for investment into the sector in the state. The ministry is deeply involved in some private public partnership at the expense of the state housing agency. The Family Homes Funds has also found an inroad into the state with the development of 604 housing units of 1- and 2-bedroom terrace bungalows, 3-bedroom terrace duplexes in Kaduna.

### **KANO STATE**

The state housing agency, Kano State Housing Corporation has not embarked on any development in the last three years. The corporation which was operating under Ministry of Works and Housing was last year moved to a new ministry under Housing and Transport. However, there was Family Homes Fund intervention in the state with the development of 757 units of 2- and 3-bedroom flats and 3-bedroom detached bungalows in Family Homes Estate, Darmanawa, Kano under public private partnership programme without involvement of the state housing agency.

### **KATSINA STATE**

In Katsina State, there is an ongoing 185 housing units which started in 2018 and being developed by the Katsina State Housing Authority. There are other private estates in the state funded by the Federal Mortgage Bank of Nigeria.

### **KEBBI STATE**

In Kebbi State, there is no housing project embarked upon by the state housing agency, the Kebbi State Housing Corporation or the government in the last three years.

### **KOGI STATE**

Outside the 140 housing units developed by Kogi Investment and Property Limited at Olele Housing Estate in Lokoja and funded by FMBN about four years ago, there is no housing project embarked upon by the state.

### **LAGOS STATE**

The state has witnessed lots of housing development in the last three years both from the private and public sectors. The State Ministry of Housing is directly involved in development of housing in the state outside the state housing agency, the Lagos State Development and Property Corporation. The ministry has developed estates such as Mobolaji Johnson Estate, Lekki; Baba Omojola Housing Estate, Gbagada; Shasha Millennium Housing Estate, Shasha; Emeka Anyaoku Housing Estate, GRA Ikeja; Ibeshe Millennium Housing Estate, Ibeshe; Oke-Eletu Housing Estate, Oke-Eletu and Ojokoro Housing Estate, Ojokoro among others some of which are sold to the people on 10 years mortgage. While we don't have access to the current record of what the ministry has done in the last three years, the state housing agency, the Lagos State Development and Property Corporation, under direct and joint ventures projects has embarked on development, some of which are ongoing, a total of 1,455 housing units comprising of different categories ranging from 1,2,3 bedrooms apartments to 4-bedroom terraces and luxury apartments. Notable among these projects are 124 units of 1,2 and 3 bedrooms Lekki apartments, Courtyard Villa Lekki consisting of 120 units 4 bedrooms maisonnetes, 68 units of terraces and 32 units flats at Bayview Elegushi Lekki among others. In tackling affordable housing in the state, the state government recently signed an agreement with

Echostone Limited to develop 2,000 housing units annually in the state.

### **NASARAWA STATE**

Nasarawa State as at today has no state housing agency following the liquidation of the state housing agency, the Nasarawa State Investment and Property Development Company Limited in 2017. The agency was hitherto responsible for development of affordable housing in the state before its liquidation. Apart from the Family Homes Funded housing estate comprising 582 units of 1- and 2-bedroom semi-detached bungalows, there was no major housing project in the state in the last three years.

### **NIGER STATE**

Niger State Housing Corporation which is the state housing agency is doing so well and with the support of the state government has been developed 164 housing units in the last two years and has kicked off another 1,200 units being funded by the Family Homes Funds Limited. The Ministry of Housing in the state is not directly involved in the construction but has provided enabling environment with state backing for the state housing corporation to function effectively. The agency will soon embark on rental housing for the people of the state.

### **OGUN STATE**

Ogun state is blessed with two state housing agencies - the Ogun State Investment and Property Corporation (OPIC) and the Ogun State Housing Corporation. Both organizations are doing so well in provision of affordable housing for the people of the state harnessing its closeness to Lagos where housing market thrives. In the last three years, OPIC has developed Orange Valley Estates with 66 units of 4-bedroom duplex and 20 units of 5-bedroom luxury homes, MTR Garden at Isheri with 600 units, New Dawn Gardens within OPIC Agbara/Igbesa Estate with 45 units of 3-bedrooms and 52 units of 2-bedroom terrace bungalows. Currently, OPIC has completed 800 units of the affordable 1,020 housing units in New Makun City being funded by Family Homes Funds and OPIC Kings Court Estate along President Boulevard OkeMosan is ongoing.

The Ogun State Housing Corporation on the other hand has completed Ibara Mews 12 units four bedrooms luxury apartments and affordable 112 units of expandable Valueville Oke Ata Estate. The Corporation is currently developing HID Awolowo Estate along President Boulevard way, Abeokuta with 76 units 2, 3 and 4 bedrooms detached and semi-detached house and the ongoing Prince Court Estate named after Governor Prince Dapo Abiodun in Kemta Idi Aba, Abeokuta.

### **ONDO STATE**

The state housing agency, the Ondo State Development and Property Corporation has not embarked on any serious massive development since 2015. The corporation was only able to develop only 100 units in Oba Ile in Akure for outright sales.

### **OSUN STATE**

The Osun State Property and Development Corporation has not embarked on any development in the last three years.

### **OYO STATE**

Outside the recently commissioned ₦2.5 billion Ajoda Housing Estate projects consisting of 360 housing units which we hope will take off without any hitches, the state

has not embarked on any housing projects in the last eight years.

### **PLATEAU STATE**

The state housing agency, Plateau Investment and Property Company Limited has not embarked on any housing projects in the last three years after completion of 27 units of PIPC Estate in Jos four years ago. The agency only concerned herself with sites and services within this period.

### **RIVERS STATE**

The Rivers State Housing & Property Development Authority has not embarked on any housing project in the last three years. The housing provision in the state capital in Port Harcourt is dominated by private developers.

### **SOKOTO STATE**

After the five units developed in 2014, the Sokoto State Housing Corporation has not embarked on any housing project in the last three years. However, the Ministry of Housing is currently developing 2 and 3 bedrooms in Sokoto without involvement of the state housing agency.

### **TARABA STATE**

Since the merger of the housing corporation with the Ministry of Housing and Urban Development in 2003, Taraba State has no housing agency. Between 2003 and 2006, the ministry was able to develop 569 housing units while 441 housing units were developed in all 16-local government of the state between 2006 and 2007. By 2007, the housing arm of the ministry was merged with the newly created Ministry of Works, Housing and Transport. In 2017, the state planned to execute 5,000 housing units in Daniel Darius Ishaku Gardens, as at now only 59 units were completed. As part of its renewed efforts to reposition housing provision in the state, the government has decided to recreate its state housing agency and the state house of assembly is about finalizing the enactment of the new bills for the creation of the agency.

### **YOBE STATE**

The state housing agency, the Yobe State Housing Corporation has not embarked on any housing project in the last three years. The last project developed by the Corporation was the 100 units of 2 bedrooms at Zanna Zakariya Housing Estate, Damaturu in 2011. However, the ministry has been embarking on various development in the state and the last attempt being a planned 1,800 housing units of 2 and 3 bedrooms to be funded by Family Homes Funds.

### **ZAMFARA STATE**

The Zamfara state has not embarked on any noticeable housing projects in the last four years.

### **FEDERAL HOUSING AUTHORITY**

In the last three years, the major project embarked upon by the Authority is the Zuba Housing Estate comprising of about 724 housing units. This is apart from some joint venture development by the Authority and some private developers notably among them is the Rockview Estate Guzape being developed in partnership with Bauhaus International Limited which is ongoing.

## THE WAY FORWARD

To say that the housing needs of our people are still very enormous is not an understatement. The outbreak of Covid-19 pandemic however has brought to the fore the years of neglect and lack of commitment to reducing widening housing shortage by successive governments both at the federal and state levels.

According to the latest National Bureau of Statistics' (NBS) report, the general unemployment rate increased from 23.1% in the third quarter of 2018 to 27.1% in the second quarter of 2020 and it is projected to rise to 30% by the end of the fourth quarter of 2020 with over 21 million Nigerians without job. Youth between the ages of 15 and 34 years were the most hit as the unemployment rate rose from 29.7% to 34.9% (over 13.9 million) as at second quarter of 2020.

The inflation rate rose from 12.82 in July 2020 to 13.22% in August 2020 and it is projected to rise above 16% by the end of 2020. In the midst of all of this, Naira was devalued to ₦380 per dollar from the initial ₦360 while the exchange rate on the parallel market rose from ₦430 to ₦495/\$1. The pump price of petrol was adjusted upward from ₦145 to ₦161 per litre. There was also 100% hike in electricity tariff effective from September. Food items went up and the inflation rose to 16% in August. All of these generated other increases in other sectors such as transport fares, medical service cost of maintenance and spare parts as well as agricultural products and services. This invariably put pressure on the pocket of vulnerable Nigerians and in the process erode the recently adjusted minimum wage increase of ₦30,000.00.

These statistics obviously portend a difficult time ahead as people will be left with just one choice - struggling for survival. But can people survive without roof over their heads? Obviously no; and this calls for pragmatic approaches to consolidate the proffered solutions and come up with practical and appropriate strategies to tackle affordable mass housing production with a view to utilizing housing as a veritable tool for economic recovery thereby empowering our people to reduce unemployment in our society.

## DEVELOPING AFFORDABLE HOUSING

One of the major challenging questions in mass housing provision in our climate is the affordability question which many have found difficult to define. It is a difficult question to answer because what may be affordable to one may not be affordable to others as a result of wage differential. This explains why major developers target people with high income for their housing projects.

To encourage more developers to engage in low-income housing therefore government needs to give tax rebates and incentives to developers to encourage them to engage in low-income housing.

The use of local building materials should also be encouraged and promoted to arouse acceptability by the general public who have developed apathy for its use. NBRI has developed so many local building materials for use in the building sector and an interlocking technology of Hydraform is gaining acceptability which can be adopted by government in areas where we have high concentration of laterite. For instance, Hydraform technology has been used to develop 350 units in Kuje, Abuja by the Federal Ministry of Works and Housing and Nigeria Air Force, while 300 units were developed by Yobe State Government in Damaturu. There are different components of local materials that have been developed that could be used to bring down the cost of development for the low income. Government should therefore be in the forefront of promoting these materials to service the needs of the low-income group.

## **MINISTRY INVOLVEMENT IN HOUSING**

There is no doubt that the Covid-19 pandemic has put a global pressure on the entire world economy but it is important for us as a nation to critically examine the peculiarity of our environment in proffering workable solutions that will address our housing challenge. While we commend the Nigeria Economic Sustainability Plan to build 300,000 housing units annually to mitigate the effect of the Covid-19 pandemic, but if the sustainability plan must succeed, the involvement of the states' housing corporations is certainly inevitable to achieve the targeted 300,000 housing units. These states housing agencies have demonstrated over the last three decades that they were able to rise up to the challenges of housing provision for the teeming Nigerian masses with enabling environment. Ministries both at the federal and state levels have no business in direct construction. Usurpation of the statutory responsibilities of housing agency in housing construction and development for state governments by the ministries is purely an unnecessary duplication of duty which will in the long run cause distraction, needless rivalry, unfair competition and sheer wastages and repetition of efforts and resources. Incessant building collapse, improper planning of our cities, charlatanism, usage of fake building materials among others are some of the consequences of distraction arising from this usurpation and participation of ministry in direct construction. The housing ministries should strictly reduce its activities to policy formulation and monitor her statutory parastatals to ensure policy compliance and accomplishment. In summary, the Ministry of Housing both at the federal and state level should concentrate on providing the enabling environment and supervision for the housing agency to fulfill its statutory mandates. Federal and State housing agencies have potential to meet the housing needs of the people but this cannot be achieved without the support of the governments. Therefore, FHA and state housing agencies should be repositioned to spearhead the provision of social housing.

## **HOUSING AND POLITICKING**

One major challenge that affected past mass housing delivery is political interference which most often affects projects. There is no continuity of housing programmes and policies by successive governments as each regime usually jettison whatever housing programmes put in place by preceding government no matter how decent and innovative such programme may be. This derailment in policies implementation is principally responsible for increasing housing deficit in our nation. Most often, this politically motivated derailment of policies are executed for selfish reason such as settling political cronies. There is therefore an urgent need to deviate from this political sentiment and quagmire with departure from the usual practice of discrediting viable policies of past regimes. Our leaders are implored to embrace progressive ideology whether instituted by their government or not irrespective of political affiliation in implementation and execution of viable housing policies and programmes and seek to pursue sustainable delivery of affordable housing on a large scale to reduce housing deficit in the country.

## **RENTAL HOUSING**

One critical area of housing that has been neglected over the years is the provision of rental housing on a large scale. Economic fundamentals such as a huge population and rising urbanization continue to put pressures on the housing market demand. According to a recent research, it was estimated that over 80% of urban dwellers rent their homes from informal landlords. The quality of most of these affordable rental housing is typically

poor, with most houses lacking basic services; and tenant's rights are most times not protected in a majority of these informal contracts executed between landlords and tenants. There is hardly any recognized Institution that provides well-structured and formal Rental Housing on a large scale targeted at the medium to low income segment in existence throughout the country. This scenario has motivated us to focus more on this area of housing to help reduce the impact of homelessness and to create a more affordable market for rental housing to drive down exorbitant rents especially in our urban centres and build sustainable choice for the people. The plan is to mitigate the hardship of the people by reducing their pressure of seeking for annual or two year rents that are usually demanded by shrewd landlords.

As an Association, we are prepared to service this segment of the market with the development of a minimum of at least 500 units of rental housing in all state capitals in the first phase of the development which will help to alleviate the housing challenge of the people arising from the post COVID-19 which affected most Nigerians. With our commitment to affordable housing for the people, the housing units are proposed to be developed for qualified Nigerian workers who do not have lump sum to buy houses outrightly but interested in rental housing in a secure and habitable environment with all necessary modern infrastructures. Our new Rental regime which comes with an option to own shall focus more on direct deduction from the monthly income of the subscribers through their employers to help the masses reduce pressure of paying front annual or sometime two years rents as usually demanded by most landlords. This initiative is fashioned out to change the face of rental housing in Nigeria.

The pilot scheme of the rental housing project is kicking off in six states namely Ogun, Plateau, Imo, Taraba, Bayelsa and Niger with our member housing corporations in those states spearheading the development.

The Association is collaborating with Family Homes Funds Ltd and other major stakeholders in the housing sector to kick-start this new initiative of affordable housing for the people. Family Homes Funds has delivered over 3,700 new homes since its creation in 2018 and has provided over 20,000 jobs and helped over 5,000 families.

Apart from this rental housing, arrangements are also in top gear to develop affordable housing for outright sales on mortgage with the Federal Mortgage Bank of Nigeria providing loans for the potential buyers to buy the houses on completion.

One of the ways we hope to achieve this is through a collaborative effort codenamed "FMBN, AHCN and NBRRI Stakeholders Collaboration on Decent and Affordable Housing" which was initiated to address affordability through the use of local building materials powered through a collaboration of the Association with NBRRI. This was a renewed effort of a similar collaboration carried out during former President Olusegun Obasanjo's regime which produced some housing estates built with NBRRI interlocking technology pioneered by Ekiti State Housing Corporation with 225 housing units. The modalities for the execution was done with FMBN providing the funds, NBRRI providing the technology while AHCN members provided the land. Other beneficiaries of the programmes then included Kaduna, Kwara and Abia states. The houses on completion were allocated to NHF contributors who accessed NHF loans to purchase the houses.

The renewed efforts of the "FMBN, AHCN and NBRRI Stakeholders' Collaboration on Decent and Affordable Housing" is geared towards making housing affordable especially to the low-income earners, and to discourage notable apathy for the use of local building materials especially red bricks. The joint committee has been working and a concrete pathway to actualizing this initiative will be unfolded soonest.

Outside the rental housing initiative with FHF and the FMBN, AHCN and NBRRI

Collaboration, we are currently at an advanced stage to bring back the old trade of affordable mass housing provision with a proposed 1,000 housing units annually in each of the states of the federation and Abuja with our initiative codenamed ERAHOMS which is geared towards eradicating homelessness in Nigeria. Arrangements for the funding are being finalized to ensure the houses are affordable with provision for mortgages for potential buyers. We are therefore soliciting for the support of state governments to assist their state housing corporations to collaborate with the Association in all states of the federation to achieve the desired objectives.

### **FUNDING NIGERIA HOUSING PROJECTS**

Projects of this magnitude certainly require huge funding and support of governments both at the federal and state levels. The recent N200 billions CBN mortgage finance loans to Family Homes Funds for the post-covid19 construction of 300,000 intervention homes for low-income earners in 36 states of the federation and the FCT is commendable and will surely impact positively on the housing deficit in the country.

To sustain newly created CBN mortgage finance and to ensure continued flow of finance for the sector, there is a need for creation of a Special Development Fund under CBN Intervention Fund for State Housing Corporations and Federal Housing Authority (FHA) for rental and affordable mass housing provision.

#### **Under this proposed arrangement**

1. The development fund that could be named "Affordable Housing Development Fund" should be created to fund rental housing for housing corporations and Federal Housing Authority (FHA) for outright rent for the vulnerable poor. The fund should be solely managed by a Special Project Vehicle in collaboration with the CBN while state housing corporations and FHA should be responsible for the construction.

2. All the existing landed properties of FHA and abandoned estates buildings in all the states of the federation should be converted to rental housing and funded from the proposed Affordable Housing Development Fund. For those land and estates at the outskirts of the city, arrangements should be made for development of all the infrastructures especially roads to open up such estates to attract patronage and such development should be funded from the intervention fund. Alternatively, some of those commercially oriented estates in major city could be traded as equity contribution by the FHA for immediate development of housing estates for outright sale for middle and high-income earners.

3. The proposed Affordable Housing Development Fund should only be made available for rental housing and affordable low-cost housing scheme while the state governments should provide landed property and the infrastructural facilities through state housing corporations for such construction as their social responsibility to the people.

4. To ensure continuous flow of funds into the rental housing, the FMBN, NMRC and Family Homes Funds Limited should be co-opted into the administration of the proposed special fund from the CBN Intervention Fund to service both the demand and supply end of the rental housing.

5. To prevent default of tenancy of the rental housing, appropriate foreclosure laws should be enacted nationally and in all the states to limit unnecessary legal tussles.

6. To ensure proper compliance to the administration of "Affordable Housing Development Fund", an independent special task force should be set up to monitor the progress of project development by the fund to prevent project fund diversion.

7. To assist in tackling the challenges of affordability questions, local building

materials should be used for construction with creation of fabrication gallery on of construction why NBRI should be empowered and funded to embark on researches on more building materials components.

8. Sources of funds to the proposed "Affordable Housing Development Fund" should be created through legislative power that would make it mandatory for:

a. Federal government to have an annual grant to the fund at an interest rates that not more than two (2) percent.

b. State governments to contribute at least one hundred-million-naira (₦100n) source from their monthly allocation at an interest rate that is not more than 2 percent.

c. Bank, insurance, pension administration companies to contribute at least two percent of their annual profit after tax as social contribution. Such contribution should be treated as investment on behalf of the contributory organizations at an interest rate that should not be more than 2%

d. Quoted companies to contribute at least two percent (2%) of their annual profit to the fund as their social responsibility and such contribution should be treated as investment at an interest rate that is not more than 2%.

One other area that requires urgent consideration and development to create a financial base for the housing sector is the Real Estate Investment Trusts Fund (REIT). The first REIT ever created in Nigeria was the ₦50 billion Union Homes Hybrid Estate Investment Trust which was launched in September 2008. As at November 2015, only three REITs namely Union Homes Hybrid, Skye Shelter Fund and UPDC were listed on the Nigerian Stock Exchange after Haldane McCall Reit that would have been the fourth Reit failed to generate the minimum 50% subscription as required by law in January 2015 initial public offer amid poor market prospects. The effect of the listed REITs is hardly felt in the housing sector. As at today, this segment of the housing finance is yet to achieve public acceptance.

Government should therefore create an enabling environment for the development and promotion of REITs market to build off-takers base to attract investors and to housing and construction sector. With the development of REITs market, attract investors will have opportunity to access funds to buy completed housing units from developers whether or not there is ready off-takers thereby warehousing those houses for mortgage or outright sales. This will also help to attract idle funds in the sector that are quietly kept and placed in fixed deposit and treasury bills generating a return income to the pocket of some privilege few to the REITs market and in the process stimulate crawling mortgage market thereby creating unhindered access to affordable mortgage as well as exit point for developers who invested in housing?

There is therefore an urgent need to develop our mortgage market to make the development of REITs meaningful. For effectiveness of the mortgage market, there is an urgent need for synergy among the principal actors in the mortgage market namely FMBN, Family Homes Fund and Nigeria Mortgage Refinance Company, to create a solid pool of funds that could be traded in the capital market for the housing sector. Government should therefore inject more funds into the market through recapitalization of the FMBN to enable more people to have access to credit mortgages in view of the low take home of the low-income earners. Family Homes Funds also need the support of the Ministry of Finance to source adequate and patient funds at low interest rates from multilateral organizations to finance low income and social housing while NMRC can latch on that to recreate and refinance mortgages at low interest rates thereby developing primary mortgage institutions.

## **AGRIC-VILLAGES: A PANACEA FOR URBAN RURAL MIGRATION**

Rural-urban migration is one of the most distressing problems facing the Nigerian socio-economic development as the desire for better employment, business opportunities and education pushes both young and old out of the rural areas to the urban areas. It has over time rapidly outweighed the rate of job created in urban cities which in turn overstretched available social and infrastructural facilities in the urban areas.

For us as an Association however, we have designed a programme to change and reverse the phenomenon of Rural Urban migration to Urban Rural migration by creating our flagship project of Agric-Village Scheme in all local governments where we shall be using agriculture to drive housing at the local and rural level thereby creating job opportunity for millions of jobless youths across the country. This will help to create new cities and reduce pressures on infrastructures on existing urban cities and will assist in creating mass jobs for the greater percentage of unemployed youth and contribute to the nation's GDP.

To ensure effectiveness and success of the Agricultural Settlement/Village, a Technical Services Consortium (TESCON) is proposed for establishment to handle and manage the activities of the farm settlement. A ministerial committee comprising the entire ministries involved in this proposed project should be established with budgetary allocation from each of the ministry. This will no doubt promote urban rural migration

## **CONCLUSION**

It is obvious from the current myriads of problems confronting the housing sector that a holistic approach is urgently required to salvage the sector from total collapse. With the effect of Covid-19 which has paralyzed most of the income generating sectors, it is pertinent to recognize that housing sector possess the most viable platform to rescue the nation from sliding into recession if approach pragmatically. The rising unemployment and inflation rates in the country calls for serious concern as to what the future holds for upcoming generation and this necessitate an urgent action to address the effect of this pandemic. Housing sector is about the only sector outside agricultural sector that has potential to generate employment and contribute to economic growth. Housing sector has great multiplied effect on job creation and it has been tested and proven over time that a three-bed room unit has potential to engage at least about 25 skilled and unskilled labours ranging from Architect, Engineer, builder, bricklayers, masonry, carpenter, food vendors etc. The roles of Housing corporations in all of these cannot be under estimated.

It is important to note that the housing needs of the people is still very enormous, which require strategic approach. The low-income group are the most hit by this dire need of mankind. Holistic solutions have been proffered in the past to the rising housing deficit. Until deliberate attempt is made to address housing challenges of low- and medium-income group, housing deficit will continue to be on the increase. Mass housing production is a veritable and sustainable tool and channel of driving economic recovery in Nigeria

Therefore, if all the enumerated recommendations stated above could be carried out, housing sector will certainly play a pivotal role in economic recovery of Nigeria amidst total global fall from accruable income from crude oil.

Thank you.

## NBRRI DG ON A WORKING TOUR OF THE SOUTH-SOUTH ZONAL OFFICE

It was a memorable occasion for staff of the Nigerian Building and Road Research Institute South-South Zonal center, Uyo, Akwa-Ibom State as the Ag. Director-General/Chief Executive Officer of the Institute Engr. Prof. Samson Duna made a 2-day routine visit to the Office 6th to 7th October 2020. The Ag. DG/CEO who was accompanied by the Head of Consultancy and Extension Services Department, Chief Daniel Makava, who had a brief meeting with staff of the zone encouraged them not to relent in their efforts in carrying out their duties.

In the same vein, on 7th October Prof. Duna made a courtesy visit to the office of the Vice-Chancellor of the University of Uyo Prof. Eniefiok Essien. In the absence of the Chancellor, the Ag. DG/CEO was warmly received by the Deputy Vice-Chancellor Nyaudoh Ukpabio Ndaeyo who fortunately happened to be the newly appointed Chancellor of the University after an election by the University Council on 6th of October 2020. The visit of the Ag. DG/CEO to Prof. Nyaudoh U. Ndaeyo happened to be the first courtesy visit made to him after his election as he is set to take over office as the new VC of University of Uyo on 1st November, 2020.

Prof. Nyaudoh on behalf of the University welcomed the Ag. DG/CEO and his entourage and appreciated the huge contribution of equipment made by NBRRI to the University. He promised that the existing relationship between NBRRI and the University will be strengthened for positive results to be achieved in area of Research and Development. He stressed that the provision of these machines is timely and are not for the University research work alone but for the benefit of the state in general.

In his speech, Prof. Duna briefed the management of the University on the challenges NBRRI is facing in terms of office space. He stated that till date, NBRRI is still occupying a rented apartment as its zonal office in Uyo. He further explained that NBRRI has initiated talks with the State Government of providing an empty space for NBRRI to use technologies to erect a permanent office which will boost the workforce of the Institute and will be beneficial to the State. He further appealed to the management of the University to use its influence to assist NBRRI in appealing to the State Government to grant this request. He then finalized that the equipment donated by NBRRI to the University are meant to reduce the stress faced by researchers in looking for machines for material testing and laboratory purposes.





## RESEARCH STAFF OF THE NIGERIAN BUILDING AND ROAD RESEARCH INSTITUTE 'NBRRI' ON A 2-DAY SEMINAR ON THE USE OF GEOGRAPHIC INFORMATION SYSTEM (GIS)

- Training and retraining builds and makes the work force in the Research Institute efficient.
- No matter your age, level and educational qualification, you need training to upgrade your expertise in your area of specialization and to meet up with the new trend of technology advancement.

These are the words of Prof. Samson Duna on Thursday 10th September, 2020 when he declared open the 2-day seminar organized by the Institute for the Research Staff.

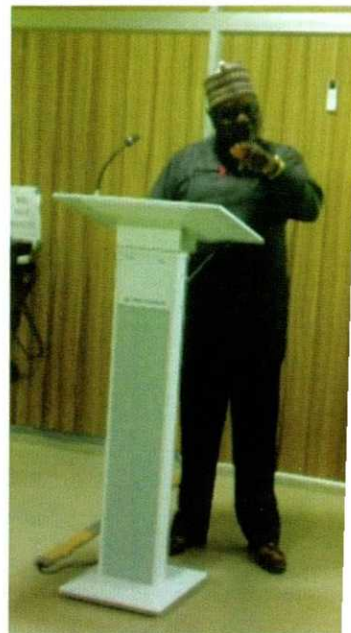
The resource person, Mrs. Fakeye Attah. M. explained that GIS is efficient and needed in all aspects of life.

The training dwelt on the application of GIS for Research Development. It is to teach research staff on Geographic Information System (GIS) and how it can be applied as a tool for data analysis, data collection, management and storage.

Geographic Information System also known as GIS is an integrated set of hardware and software tools used to manipulate and manage the digital spatial (geographic) and related attribute data. It integrates common database operations such as the query and the statistical analysis with the unique visualization and geographic analysis benefits offered by maps. GIS Technology can capture all kinds of the geographical reference data as well as the digital images from the Earth's surface and it presents the data in a 3-D. GIS performs the tasks of map making and geographical analysis faster and with more sophistication than traditional manual methods.

GIS is used in conservation research as it offers better time management as field location is almost instant and collection of data is fast as long as signal can be found. GIS technology provides facilities for data capture, data management, data manipulation and analysis the results presentation in both the graphic and digital form, with a particular emphasis upon preserving and utilizing the inherent characteristics of spatial data. There are many applications which can be displayed and inventoried with the use of GIS such as the natural resources, the wildlife amongst others.

The advantages of GIS technology are that it offers better management, quick collection of data and it has high accuracy. It presents better predictions and analysis. It can model spatial activity precisely. It has the ability to generate maps with the information shown. It allows us to view, understand, question, interpret & visualize the data in many ways that reveal relationships, patterns and trends in the form of maps, globes, reports and charts. GIS technology can be integrated into any enterprise.



information system framework. GIS improves the organizational integration.

However, the disadvantages of GIS are that it is very expensive and It has relative loss of resolution and it has violation of privacy. The data availability is a major issue, If the data is not available, then the GIS system is useless. Its technical nature may portray results as being more reliable than they actually are and the errors and the assumptions can be hidden, leading to a lack of questioning into the results. GIS technology is not like the other programs and It does not come off the shelf So they must be assembled and constructed to the user design and this could be a long, complex and costly process. Some GIS systems therefore can fail in their implementation as their creation was rushed or inadequately planned.

GIS data can be separated into two categories: spatially referenced data which is represented by vector and raster forms (including imagery) and attribute tables which is represented in tabular format. Within the spatial referenced data group, the GIS data can be further classified into two different types: vector and raster. Most GIS software applications mainly focus on the usage and manipulation of vector geodatabases with added components to work with raster-based geodatabases.

The power of GIS resides in its ability to use many types of data related to the same geographical area to perform the analysis, integrating different datasets within a single system. But when a new dataset is brought to the GIS, the software imports not only the data, but also the error that the data contains. The first action to take care of the problem of error is being aware of it and understanding the limitations of the data being used.



# HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY VISITS NBRI

'NBRI has catapulted itself into limelight through its massive and positive impact promoting local contents in the Road and Building Sectors in the country'. This was an appraisal of NBRI's huge contributions through the use of NBRI's Technologies and Innovations in the construction industry highlighted by the Chairperson of the Federal House Representatives' Committee on Science and Technology, Hon. Barr. Beni Lar. The committee visited NBRI's administrative head office in Abuja on 15th October, 2020 to carry out its oversight functions on the agencies under the Federal Ministry of Science and Technology.

In her speech, Hon. Barr. Beni Lar stated that NBRI has done great job in most constituencies in the country through the use of NBRI's technologies for the construction of rural roads and blocks of classrooms which her constituency has one of the beneficiaries. She then encouraged the institute to do more in the area of building collapse in the country.

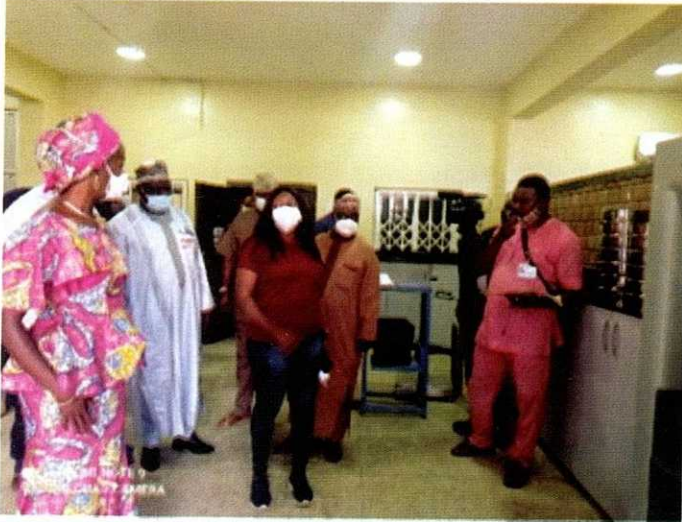
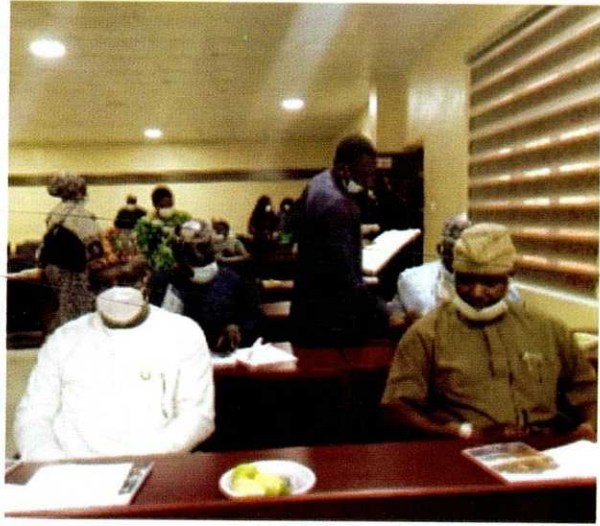
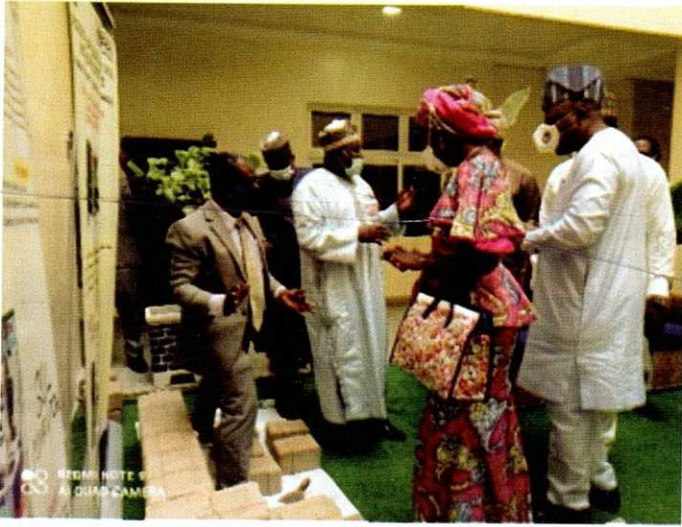
The committee members were warmly received by the Ag. Director-General/Chief Executive Officer of the Institute Prof. Samson Duna and were conducted on a tour round the compound to see the various machines in NBRI's Laboratory and the display center. The Ag. DG/CEO explained to the members of the committee the various functions of the machines, as he also used the opportunity to appreciate the huge contributions of the Hon. Minister of Science and Technology, Dr. Ogbonnaya Onu in acquiring the machines.

In his welcome address, Prof. Duna appreciated the Chairperson of the committee, Hon. Barr. Beni Lar for her struggle and positive impact and immensely contributions to the success of NBRI having a permanent office space today after occupying rented apartments for almost forty years.

Prof. Duna also explained to the members the major functions of NBRI when it comes to Research and Development. He also stated some contributions the Institute has attained so far. He never failed to inform them that NBRI has offices in all the Six geo-political zones in the country. (South-South {Uyo Akwa, Ibo State}, South – East {Nnewi, Anambra State}, South West {Lagos, Lagos State}, North – Central {Jos, Plateau State}, North – East {Gombe, Gombe State}, North – West {Kano, Kano State}).

He concluded by appealing to the committee to do all it could to assist NBRI in achieving its goals in the promotion of local materials in the country. He stated that the closure of boarders should be a great opportunity in promoting local products in the country which will improve job creation and increase the country's GDP.





**AG. DG/CEO, NBRRI ENGR. PROF. SAMSON DUNA CONFERRED WITH THE PRESTIGIOUS HONOUR OF FELLOWSHIP OF THE NIGERIAN SOCIETY OF ENGINEERS (NSE)**

The 2020 annual conference of the Nigerian Society of Engineers with the theme "Circular Economy in Medical Waste Management" happens to be the 5th College of Fellows Roundtable Symposium and the 16th Fellowship Conferment Lecture and Ceremony of NSE which was declared opened on Monday 16th November, 2020 at the International Conference Center (ICC) Abuja.

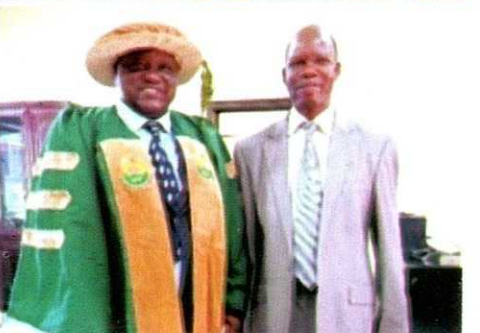
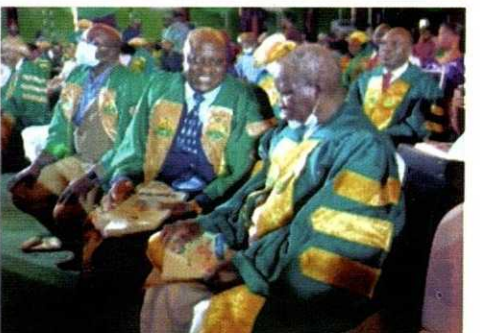
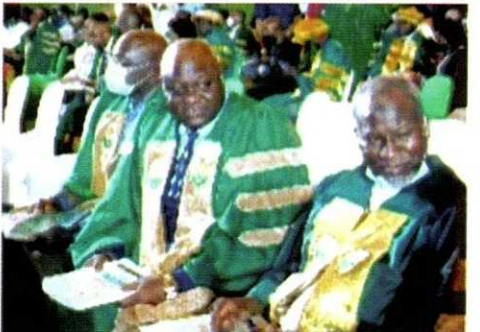
The ceremony started with a great encomium as the College of Fellows of the Institute presented the approved Engineers of about One hundred and fourteen (114) in number who have distinguished themselves in various fields of Engineering and are worthy to be conferred with the prestigious award of Fellows of the Nigerian Society of Engineers (FNSE).

Among these great men and women, is the Ag. Director-General/CEO of the Nigerian Building and Road Research Institute (NBRRI) Engr. Prof. Samson Duna. Also conferred is the Honourable Minister of Power, Federal Republic of Nigeria, Engr. Saleh Mamman and a host of others.

Conferring the Fellowship award on them, the president of NSE, Engr. Babagana Mohammed encouraged the conferees to uphold the ethics of the great Society of Engineers at all cost.



# Photo Gallery



## TETFUND VISITS NBRI'S NLC, OTA COMPLEX FOR INSPECTION

In their quest to strengthen research and development in tertiary institutions through the use of modern laboratory facilities, the Tertiary Education Trust Fund (TETFUND) constituted a high-powered delegation to inspect facilities at the NBRI's National Laboratory Complex (NLC) Ota, Ogun State.

The delegation comprises of Mr. David Josiah of TETFUND, Dr. Emeka Orji of National Office for Technology Acquisition and Promotion (NOTAP) and Dr. Viva Yakubu Ibrahim of Ahmadu Bello University Zaria. The team was received by the Head of Building Research Department Dr. Sulymon Nurain who represented the coordinator of NLC Dr. C.C Osadebe.

The team inspected NBRI Laboratories and various NBRI products including construction gargets, Madedor tiles (NBRI tiles named after the first DG/CEO of NBRI), the clay tiles which is smaller than the Madedor's tiles, and went into a brief session which discussions were raised on techniques in construction, the use of local building and construction materials to determine the most effective and economic methods of their utilization.

Dr. Sulymon Nurain in his remark acknowledged and welcomed the important guests. He gave a brief history on the establishment of NBRI as well as its mandate on Research and Development (R&D) and other aspects of engineering materials in relation to the construction industry. He thanked them for coming and looked forward to a great partnership.

Further, Mrs. Fakeye A. who spoke on behalf of the Director of Road Research Department made emphases on building and road

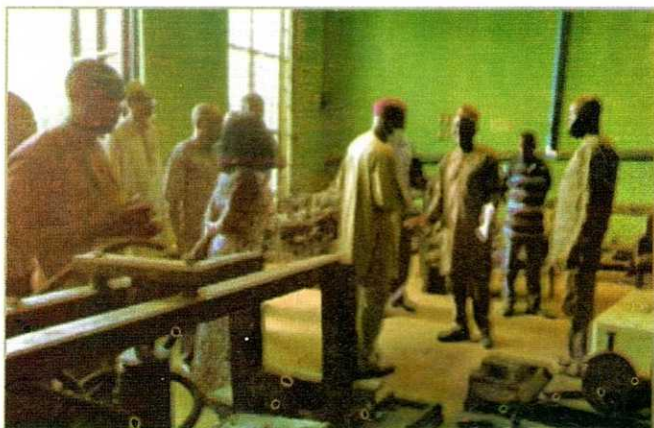


construction with particular reference to road failure research and investigation, especially the Port hacourt/Enugu road and the Abuja-Kano road. Main causes being geological and compatibility of materials used within the terrain. She also spoke on the digital form of research, with NBRI producing its first engineering Atlas Map, which covers most parts of the southern states of Nigeria.

Engr. Subair W.O of Engineering Materials Research Department (EMRD) spoke on machine fabrication for both building and road research. The bitumen spraying machine how it's used and the ongoing fabrications.

Dr. Orji on behalf of the delegation expressed gratitude and suggests the following:

- Idea rooms for NBRI Staff where challenges can be identified and solutions can be proffers.
- The need for collaboration between NBRI and the Ministry of Works, courtesy visits between NBRI board members as well as that of FERMA.
- Local contents to be standardized and give value for our money in comparison with the foreign ones. Like; "The Royal Ceramic produced by Indians.
- The need for patency of NBRI R&Ds as well as having a trade mark secret stating that the protection of the products is important before you exhibit them.
- Commercializing NBRI's technology and licensing them for regions which can bring royalty to the Institute.
- Advocacy for the awareness of using NBRI's website.



## COURTESY VISIT BY THE MANAGEMENT OF ARTISANS SKILLS EMPOWERMENT INITIATIVE TO NBRI

"Skillfully trained artisans are what we need in the construction sites for a better delivery of project". These are the words of the Ag. DG/CEO of the Nigerian Building and Road Research Institute Engr. Prof. Samson Duna on Thursday 26th of November, 2020 when he received members of the Artisans Skills Empowerment Initiative (ASEI) in his office at the Abuja Head Office.



Engr. Amos AbeniOminyi who is the MD/CEO of ASEI and the leader of the team explained that the Artisan Skills Empowerment Initiative is an NGO established for training of Nigerian Youths in skills acquisition, retraining of indigenous artisans and craftsmen in construction skills as well as the socio-economic advancement, welfare and empowerment needs of artisans.

He stated that the establishment of the AESI is as a result of the absence of productive technical colleges in Nigeria and lack of sufficient trained manpower in the construction industry which had led to the massive importation of skilled manpower from other countries, while millions of Nigerian youths' wallow in poverty and unemployment. The AESI was also set up to compliment the good work some government agencies are doing in this regard such as ITF, N-Power, NBRI etc.

Engr. Amos emphasized that the purpose of their visit is to solicit for collaboration with NBRI in areas of training and re-training of artisans because the task of training and acquisition is very expensive and burden of such is overwhelming for the organization to bear alone.

He stated that the organization is made up of representatives from Council for the Regulation of Engineering in Nigeria (COREN), Nigerian Society of Engineers (NSE), Nigerian Building and Road Research Institute

(NBRI), Nigerian Association of Technologists in Engineering (NATE), and FCT Social Development Secretariat (FCTSDS). Also, the organization is currently in partnership with notable bodies like NBTE, NVQF, CORBON, NIC and some stakeholders in the construction industry.

In response to the delegates, Engr. Prof. Samson Duna acknowledged the efforts the organization has made so far and encouraged them to do more. He promised that NBRI will do all it could to collaborate with them in areas of training of artisans which is one of the mandates of NBRI.

Pro. Duna also encouraged them to establish a stronger tie with the National Board for Technical Education (NBTE) so that any certificate given to trained artisan by the organization will be valued and recognized in any government agency. He then used the opportunity to notify them that NBRI is working on expanding its Artisans Learning Guide Manual from Ten trades to Twenty trades and that the knowledge of AESI will be needed in developing these guides.

The knowledge filled meeting ended with a vote of thanks and words of encouragement by the Director of Admin and Personnel NBRI Mrs. I. E. Jude-Iloma. She appreciated members of AESI for the achievements they have attained so far in the training of Artisans and charged them to do more for the growth of the country.

## NBRI HONOURS ITS STAFF AS THEY BOW OUT OF SERVICE

The event which took place on Wednesday 15th December, 2020 at the NBRI NLC, OTA was attended by members of NBRI Board, the Ag. DG/CEO of NBRI, Directors, Heads of Departments and other Staff of the institute.

The Ag. DG/CEO NBRI in his opening remark welcomed the Board Chairman and members, and appreciated the Directors and Heads of Departments as he stated that he would not have asked for a better management team to work with than what he has in place.

He applauded the retirees for their service to NBRI and Congratulated them for retiring well and strong and that their legacy will remain in the sands of time as well as in the hearts of staff of NBRI their services have influenced positively.

In the same vein the Chairman of NBRI Governing Board, Hon. William Wadni, congratulated the retirees, he then gave words of encouragement and told them that because of their enviable legacy and service to NBRI, they might be called upon at any

time for consultations on some matters. He prayed for the retirees, and advised them to engage themselves in other ventures as they now have vast knowledge and time, that being retired those not mean the ball has stopped rolling.

The retirees were presented with awards of service as well as gift items from management of NBRI as well as members of staff.

The retired staff are:

1. Dr. Francis Aitsebaomo. Director, Road Research Department/Coordinator NLC, OTA.

2. Mr. Raph Menegbe. Director, Admin and Personnel

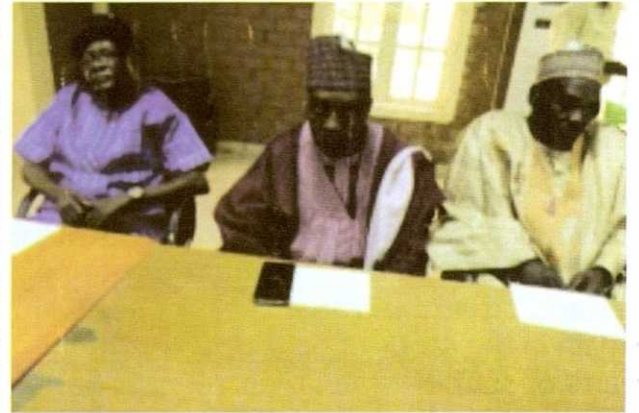
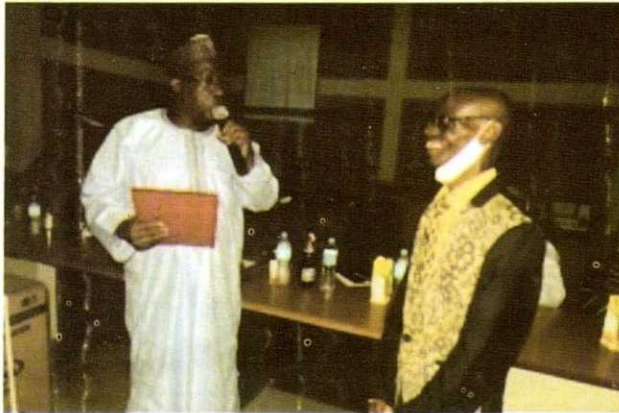
3. Engr. Hassan Danjuma. Director Procurement and Maintenance.

4. Mr. Edwin Ezeh. Deputy Director, Admin and Personnel.

5. Mr. Henry Fawolu. Building Research Department

6. Mr. Darlington Alozie. Admin and Personnel.





## CITATIONS OF THE RETIREES

### DR. FRANCIS OMOKEKHAI AITSEBAOMO

Dr. Aitsebaomo hails from Fugar in Etsako Central Local Government of Edo State, but had his early life in Ghana in the sixties. On his return to Nigeria, he attended St. John's Grammar School Fugar and then gained admission into Yaba College of Technology, Lagos but later left for Sir Sanford Fleming College of Applied Arts and Technology, Peterborough, Canada from 1978 - 1981 where he obtained Diploma in Civil Engineering.

He joined the service of the Nigerian Building and Road Research Institute in 1983 as a Higher Technical Officer and rose through the rank to the pinnacle of his career as a Director and Head of Road Research Department and Co-ordinator, NLC, Ota after acquiring the needed qualifications ranging from Post Graduate Diploma in Soil and Water Engineering from the then University of Agriculture Makurdi, Master of Science degree and Doctor of Philosophy in Environmental Geotechnics in Rivers State University of Science and Technology, Port Harcourt.

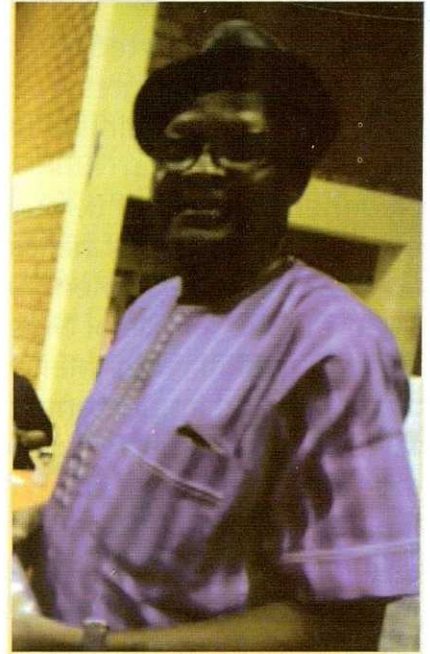
Dr. Aitsebaomo, while in service carried out several research programs on engineering investigation of Subgrade Soils, Geotechnical Investigation of Problematic Soil for Foundation Designs, Soil Erosion Studies, Road Failure Investigations, Applications of Geographic Information System (GIS) in Environmental Studies, appraisal of Marginal Lands Developments of Appropriate Technology for the Design, Construction and Maintenance of Rural Access Roads in Nigeria.

He attended several courses amongst which are Design Implementation and Evaluation in Science and Technology and Innovation (STI), Customized Training on Information Technology, Skill Development Program on the use of SOKKIA GSR2700 ISXGPS and its application packages in 2009, Effective Asset Management and Financial Control in the Public Service in 2004, National Training Workshop on Processing and Computer Programming in 1998. General Management course at Academic Staff College of Nigeria (ASCON) just to mention a few.

Among other honours, he is a member of several professional bodies including COREN, Registered Civil Engineer, Environmental Information System (EIS), American Association of Geographers (AAG), African Association of Remote Sensing and Environmental (AARSE), Technical Committee on Building and Civil Engineering Materials of Standards Organizations of Nigeria (SON).

He has authored and co-authored several publications comprising articles in revered scholarly journals, technical papers, reports, seminars and conference proceedings. One of his articles titled Geotechnical Modeling of Landscape Sensitivity to Soil Erosion in Parts of Ebonyi and Cross River States of Nigeria, won the best technical paper award from the Nigeria Society of Engineers in 2009.

He is happily married to his beautiful wife Mrs. Grace Aitsebaomo and blessed with children.



**MR. RAPHAEL MENEGBE**

Mr. Menegbe, Raphael Atsumbe popularly called 'Mr. Ralph' was born on 27th June, 1960 at Zaria; he is an indigene of Kogi State. He has M.ED (GC) 1989; B.ED (S/STD) 1984; NCE 1980, WASC 1976.

Mr. Menegbe started his career in 1984 in the education sector where he progresses from an Education Officer to the rank of Principal Administrative Officer.

He assumed duty in NBRRI on 18th March, 1997 as a Principal Personnel Officer, and through hard work and determination he rose to the peak of his career as Director, Administration and Personnel Department before his retirement in 2020.

While in the service of Nigerian Building and Road Research Institute (NBRRI), Mr. Menegbe a seasoned Administrator introduced and implemented many policies and programmes that led to the Institute having a vibrant, effective, efficient and productive per

He is a Member of many professional bodies which includes Nigerian Ins Management (NIM); Counseling Association of Nigeria (MCAN); Social Studies Ass of Nigeria (MSOSAN), Chartered Institute of Personnel Administration of Nigeria Institute of Corporate Administration, etc.

He is happily married and blessed with children.



**ENGR. HASSAN DANJUMA**

Engr. Hassan Umar Danjuma was born on the 13th February 1960 to the family of Late Mallam Umar Danjuma and Late Maryam Umar Danjuma of Kanti Quarters in Daura, Katsina State. He attended Islamiyya Primary School, Daura from 1967 to 1974. He later attended Government Secondary School, Funtua from 1974 to 1979.

In 1980, he gained admission into the School of Basic Studies Ahmadu Bello University, Zaria and sat for his IJMB Examinations in the same year. He gained admission to study Bachelor's Degree in Civil Engineering in the same University in 1981 and graduated in 1985.

Between 1985 and 1986 he served National Youth Service Corps (NYSC) with Lagos State, Ministry of Works and Housing, Alausa, Ikeja where he was involved in the design and supervision of a number of projects including the construction of Agege Express Road (Phase I).

He was employed as pupil Civil Engineer by Kaduna Urban Planning and Development Authority (KASUPDA) in 1987 and redeployed to Katsina in the same year at the creation of Katsina State. He served under the Katsina Urban Planning and Development Authority (KASU'PDA) until 1996 when he was granted leave of absence to work for Parkman Nigeria Limited, a Consultant with the Petroleum Trust Fund (PTF).

He was the Principal Resident Engineer (PRE) under Lot 19 Petroleum Trust Fund National Highway and Urban Roads Rehabilitation Program (PTF/NHURRP) covered over five hundred kilometers in Adamawa and Taraba States. He later



the Chief Resident Engineer. He was granted study leave to study Master's Degree in Highway and Transportation in 1990 which he completed in 1992.

He returned to Katsina Urban Planning and Development Authority (KUPDA) in 2003 and was promoted to the rank of an Assistant Director (Civil Engineering). In 2005, he was granted a leave of absence and joined the International Fund for Agricultural Development/Community Based Agricultural and Rural Development Programme (IFAD/CBARDP) under the Project Coordinating Unit, Project Support Office Katsina of the Federal Ministry of Agriculture and Rural Development covering the seven northern states of Nigeria comprising Borno, Jigawa, Katsina, Kebbi, Yobe, Zamfara and Sokoto States. He held the post of Community Infrastructure Engineer in-charge of Community Infrastructure Projects in water, roads, health and educational facilities.

In 2007, he was employed in NBRI as a Deputy Director, Consultancy and Extension Services in the Institute. In 2012, he was promoted to the rank of Director, Procurement, Maintenance and Physical Planning in-charge of coordinating all procurement activities of the Institute including "Due Process".

Engr. Hassan U. Danjuma participated actively in the establishment of the Procurement, Maintenance and Physical Planning Department including relevant training of members of staff. He also played active role in the construction of NBRI Headquarters Abuja otherwise known as "the NBRI House".

He is married with eight (8) children, five boys and three girls. His hobbies include jogging and reading.



#### **MR. EDWIN EZEH**

Mr. Ezeh, Edwin Chukwuemeze fondly referred to as Pastor Ezeh was born on 15th August, 1963 at ObolloAfor, Udenu Local Government Area of Enugu State, Nigeria. Mr. Ezeh holds a Masters' Degree in Public Administration from University of Calabar, Cross River State Nigeria; Higher National Diploma in (Secretarial Studies), 1995; National Diploma in (Secretarial Studies), 1989; General Certificate of Education (O'level) 1993; FSLC (1979) and has won many awards in the course of his academic pursued.

Mr. Ezeh's career started at the Federal Polytechnic, Oko from 1985; He proceeded to University of Agriculture, Makurdi from 1990. He assumed duty in Nigerian Building and Road Research Institute, Abuja on 10th August, 1998 as a Principal Secretary Assistant III; through hard work and determination, he rose to the rank of Deputy Director, Administration and Personnel Department until his retirement in 2020.

While in service with the Nigerian Building and Road Research Institute (NBRI), Mr. Ezeh held the following positions: Chairman of the Committee that produced the Finance/Administration Welfare Document; NBRI Desk Officer, Bureau for Public Service Reform; Chairman, NBRI Anti-Corruption and Transparency Unit. He worked with the Director of Administration and Personnel Department in the Institute's Management Committee and the Institute's Governing Board Secretariat.

He was the Secretary of the Pension and Gratuity Board of Trustees until the PTAD took over the administration of the old Pension System in August, 2015. He was the head of Pension and Gratuity Section a post he held till he retired.

In the course of service Mr. Ezeh received many letters of awards and commendations

from the various places he worked for his outstanding performance and discharge of duties.

Mr. Ezeh is a Member of Nigerian Institute of Management (NIM); Member of Chartered Secretaries and Reporters (ICSR), etc.

His hobbies are writing on Christian Issues and Teaching.

He is happily married and blessed with four children.

### MR. HENRY FAWOLU

Mr. Fawolu Adebayewa Henry hails from IlaraMokin, Ifedore Local Government Area of Ondo State. He was born on the 8th February, 1964.

He is a man with a humble beginning. He attended St. Michael Primary School IlaraMokin, Anglican Grammar School, IgbaraOke and subsequently Government Technical College, Okitipupa all in Ondo State.

Mr. Fawolu assumed duty in NBRI on 19th March 1985 as a messenger on USS 01. He worked in the library and Account as messenger. He upgraded and converted to Technical Assistant and posted to Architecture division as Technical Assistant in training having an additional qualification in trade Test 2 and 3 and City and Guild. He was subsequently promoted and reached the bar of his cadre as Chief Technical Assistant on CONRAISS 06.

While in Architecture division, he was able to develop himself to be able to use CAD application in Architecture designs. He was involved in Post Occupancy Evaluation in FESTAC Town, Lagos, Rural Housing Project in Nigeria and Anthropometric Data in Six Geopolitical Zones in Nigeria among others.

He is a founding member of the Institute Football Team known as NBRI Bombers. He is happily married with children.

### MR. DARLINGTON ALOZIE

Mr. Alozie Darlington Elijah hails from Ayara Umuahia Local Government Area of Abia State. He was born on 1st February 1960. He attended Union Primary School Ayara, Umuahia and Community High School Umuahia.

Mr. Alozie assumed duty in NBRI on 1st September 1998 as office Assistant on USS 01. He was posted to NBRI Wazobia House at Yaba to assist in securing the property until the project was completed. After the completion of the NBRI house, he was recalled to the office where he worked in Admin Department, Engineering Materials Research Department and Road Research Department. He rose to the rank of clerk, having upgraded his O' level certificate. He reached the bar of his cadre as Chief Clerical officer on CONRAISS 06.

He retired on 1st February, 2020 having attained the mandatory age of 60 years.

He is married with children. He is popularly called Mr. Darlington the Father. Goodness and Mercy and Grace shall follow us.



## ENGR. PROF. SAMSON DUNA CONFIRMED AS THE DIRECTOR-GENERAL/CHIEF EXECUTIVE OFFICER OF NBRI

The Honourable Minister of Science and Technology (FMST), Engr. Dr. Ogbonnaya Onuon Monday 21st December, 2020 presented the official letter from Mr. President, His Excellency, President of the Federal Republic of Nigeria, Muhammadu Buhari GCON conveying the confirmation of Prof. Samson Duna as the fifth Director-General/Chief Executive Officer of Nigerian Building and Road Research Institute.

He was born on the 13th of March, 1968 in Katsina-Ala Benue state. Prof. Samson Duna hails from Billiri LGA, Gombe state. An erudite scholar who had his First School Leaving Certificate in 1980; General Certificate of Education, June 1985 from Government Science Secondary School, Toro; Bachelor of Engineering in Civil Engineering in 1991 from Abubakar Tafawa Balewa University (ATBU), Bauchi; Masters of Science, Civil Engineering in 1998 from Ahmadu Bello University, Zaria; Doctor of Philosophy in 2012 from ATBU, Bauchi.

Prof. Samson Duna is a member, Nigerian Institute of Engineering Management, Fellow of the Nigerian Society of Engineers, a COREN Registered Engineer and a Fellow of the Nigerian Institute of Civil Engineering. He started his career as a Graduate Assistant in 1992 from ATBU, Bauchi where he rose to the rank of Professor of Civil Engineering in 2017.

Before his appointment, he was the Director, Research and Acting Director-General/CEO of Nigerian Building and Road Research Institute.

Prof. Samson Duna has many International and Local publications, seminar and conference papers, productive works as well as articles on professional issues. He has supervised many undergraduate and postgraduate students.

He has a lot of awards to his credit and loves Investigative Engineering Research, interacting with the youths, assisting the less privilege, watching football and community development through communal effort.

While receiving the letter of confirmation, Prof. Samson Duna expressed his readiness to work for the positive growth of NBRI and the betterment of the country as he states, "I promise to take NBRI to a higher level than I met it and to work with the cooperation of all staff of the Institute".



# MASS HOUSING THROUGH THE USE OF NBRI STABILIZED EARTH BLOCKS

Housing gives man a sense of mental security, protection from adverse weather conditions and other impending dangers, it boosts social well-being and helps promote self-esteem which in turn makes him comfortable and proactive to achieve other needs and set goals in life. A nation progresses when its citizens are provided with affordable housing as most of the labour force become more productive when they are adequately housed thus boosting the labour output and general development of the nation.

It is against this background that we must recognize the importance of the construction industry in the socio-economic development of a nation. Many a times, the national progress, technological and political advancement of most countries are reflected by pedigree of their construction industry and the feats achieved over time. The Nigerian building and construction sector should be no exception and as such been described by Okigbo (1982) and Mogbo (2001) as being 'important' and 'crucial' to her economy. Building materials were identified by Abiola (2000) as one of the principal factors affecting the performance of the building construction sector. With an estimated population growth rate of about 2.5%, it is believed that 1.5 million new homes would be required annually between 2012 and 2025 (Hogarth et al, 2015). The magnitude of the housing deficit in Nigeria is such that government alone cannot cope with its mitigation. As a result, public-private partnerships are gaining ground as an important route for mitigating the housing deficit in Nigeria. (Ibem and Aduwo, 2012).

## NBRI AND ITS ROLE IN TACKLING HOUSING DEFICIT IN NIGERIA

Right from inception, the Nigerian Building and Road Research Institute has placed a priority on the development of alternative building materials which are locally available and the Compressed Stabilized Earth Blocks (CSEBs) is one of such innovations. The use of earth construction materials, techniques, and equipment are environmentally friendly and provide both comfort and affordability. This

CSEB is a primary product from the natural clay in our environment referred to as laterite.

CLAY: Is the oldest natural building materials. It consists of a mixture of clay, sand, and dust. It may also contain coarser particles (gravel) or organic material. The most common way to use clay for construction is in the form of clay bricks or in the form of ramming. In addition, it presents the filling of half-timbered construction and wood framed construction or as a clay plaster.

## COMPRESSED STABILISED EARTH BLOCKS

(CSEB): Compressed Stabilized Earth Blocks (CSEB) are basically made from local materials (Laterite) which is readily available in various parts of the country. The blocks are interlocking blocks and do not require plaster, paint and cement mortar in bonding the blocks during construction, thereby reducing building cost.

The use of CSEBs as a walling material is a sustainable construction technique as it is affordable, durable and accessible. When compared with alternatives such as fired brick and sandcrete blocks, CSEBs offers lower construction costs at comparable quality, and is suitable for a wide range of environments, and dramatically reduces the impact on the environment.

Other advantages are that it ensures the use of locally available construction materials thereby reducing transportation costs; ensures the availability of quality and affordable housing for a wider population; creates job opportunities as the technology requires semi-skilled labour which are easily transferable to locals; it generates local revenue as the materials and labour are sourced locally; and it is more energy efficient considering its lower embodied energy. CSEBs have very good insulation and thermal properties and also possess the ability to absorb atmospheric moisture resulting in a healthier environment for the occupants.

Based on the cost analysis carried out by NBRI on the blocks, it was found that NBRI Compressed Stabilized Blocks are cheaper alternatives to Sandcrete blocks, giving a 20% reduction in the total building cost. From the Bill of quantities computed and using CSEBs

in the construction of 1, 2 and 3 bedrooms a percentage cost reduction of 22%, 20% and 21% were obtained respectively compared to sandcrete blocks. These are interlocking walling units made from 90% earth (laterite) and 10% cement and water. The blocks are dry-stacked, with each block interlocking into adjacent blocks to create strong monolithic wall. The blocks are also laid to finish with a pleasant rustic-red color of earth, obviating the need for plastering or painting.

**BENEFITS OF THE NBRRI CSEB**

- Clay which is the main constituents are locally and abundantly available
- Less use of cement which is an expensive material for building
- Blocks are dry-stacked, interlocking into each, into a monolithic structure
- Ease of use with little or no supervision
- Ability for on-site production, curing and usage

**APPLICATION OF NBRRI TECHNOLOGY**

The CSEB have been deployed in all the 6 geo political zones of Nigeria, as constituency projects. Examples are skills acquisition centres, classrooms, assembly halls, healthcare centres, etc. A comparative analysis was made for the walling materials in a 2 bedroom and 3 bedrooms respectively. A huge percentage difference was recorded.

**SUMMARY**

Three-bedroom Conventional NBRRI Technology (1). Internal and external walls 1,225,000.00 979,650.00. (2) finishes 536,700.00. Total 1, 761700 979,650 percentage difference 44.3%

Two-bedroom Conventional NBRRI Technology (1). Internal and external walls 1,155,000.00 882,000.00. (2) finishes 566,300.00. Total 1,721300 882,000 percentage difference 48.7%.

It is to note that these blocks are compressed with a force of 5N/mm<sup>2</sup> using hydraulic or manually operated machines. This makes them dense and suitable as external and internal walling material.

**NBRRI COMPACT INTERLOCKING BLOCK MAKING MACHINE**

**i. FEATURES:**

- Dimension (1100\*600\*1500) mm
- Retractable tricycle suspension system
- A 6.5hp water cooled diesel engine

- Speed of 2800 rpm
- 1500 blocks / day
- Portable

**ii. SIGNIFICANCE/BENEFITS:**

- Reduction of machine production cost by trimming-off excess capacities/components
- Reduction of operational production cost by adopting lower fuel and oil utilizing mechanical systems
- Ensuring machine portability with minimal manual ease and at a comparative lower cost
- Reduction of production down time by utilizing locally available serviceable standard parts
- Reduction of production cycle by fully automating the actuation mechanisms
- Adopting tropical weather friendly systems
- Closing the overall national CSEB's production demand gap
- Creation of a value chain in the utilization of local raw materials and methods
- Promotion of inventions and innovations in the Institute's STI policy
- Fast tracking the Commercialization of the Institute's interlocking blocks walling technology through Prototyping
- Enhancing PPP strategy in Building sub-sector of the construction industry.

**iii. APPLICATION:**

- Small and Medium scale housing production
- PPP projects
- Energy demand reduction-based projects
- Remote sites

**CONCLUSION/RECOMMENDATIONS**

In line with this, it is imperative to recognize the fact that the cost reduces when it is to be deployed in multitudes.

1. Restructure and adequately fund the Nigerian Building and Road Research Institute (NBRRI) to perform its statutory role.

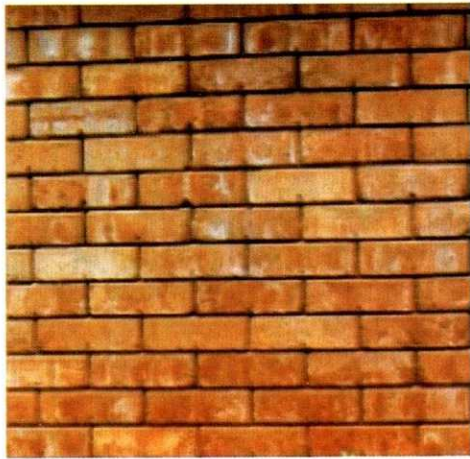
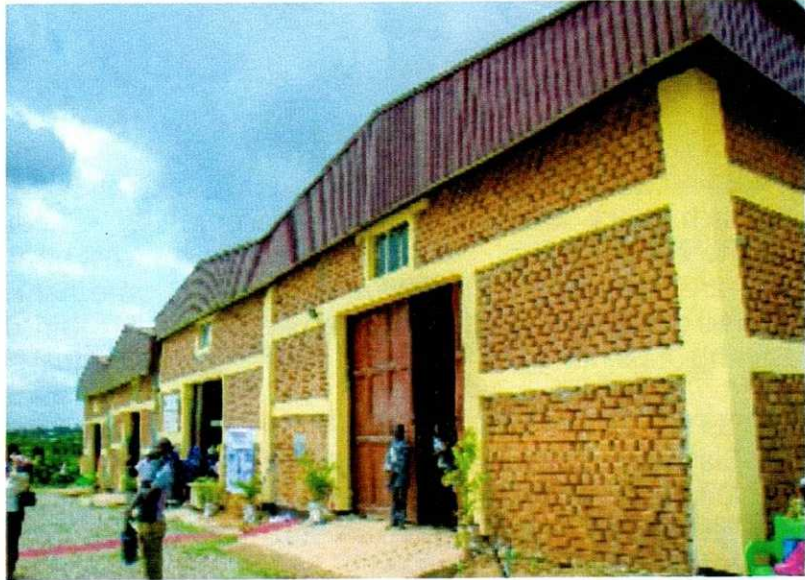
2. Grant fiscal incentives to small and medium scale local manufacturers of locally sourced building materials.

3. Reduce the dependency on imported construction materials and technologies. 4. Encourage the use of laterite/clay (CSEB) as a walling for mass housing employment and wealth generation.

4. The use of CSBs in mass housing delivery programmes can be promoted through effective public enlightenment programmes targeted at all stakeholders.



Construction of Duplex using NBRI'S CSEBs



Compressed stabilized Earth Blocks (CSEBs)



NBRI compact Interlocking Block making machine

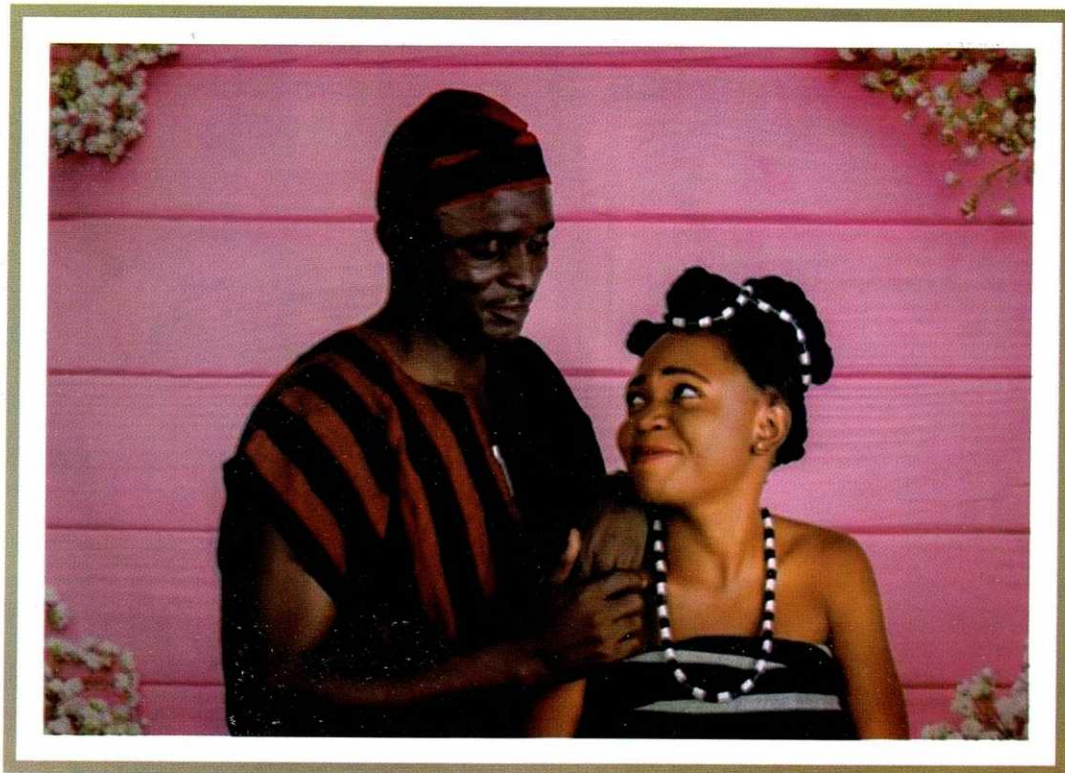


Construction of 1-Room using NBRI'S CSEBs

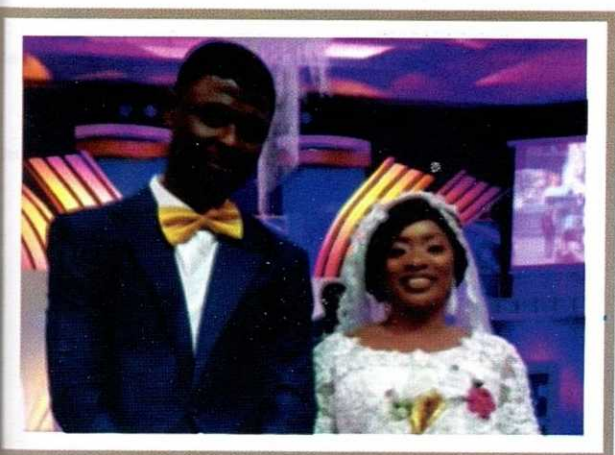


Construction of 3-Bedrooms using NBRI'S CSEBs

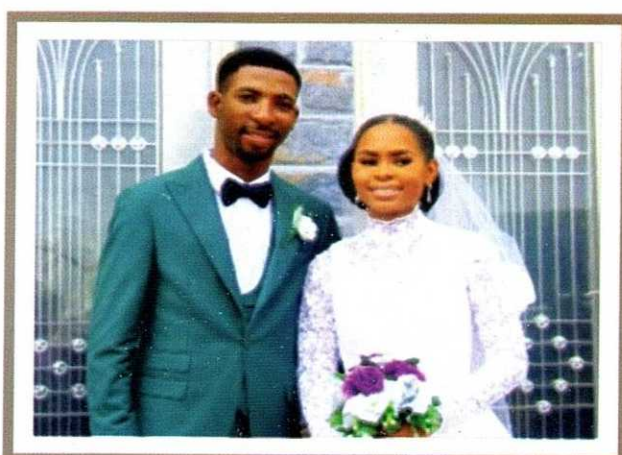
# Wedding



MR. OLOTU MUHAMMED OF PIT DEPARTMENT, ABUJA MARRIED FORMER MISS. JOY VEHE ON 4TH SEPTEMBER, 2020 IN BENUE STATE



MR. AIKPEHAE IBHAFIDON ITUA OF ACCOUNT DEPARTMENT, OTA MARRIED FORMER MISS. ABRAHAM ELIZABETH ON 29TH AUGUST 2020 IN ABUJA



MR. AYOPO BAMIDELE ALO OF BRD, OTA MARRIED FORMER MISS. BLESSING OLUWASEUN ABOLARIN ON 17TH OCTOBER, 2020 IN LAGOS

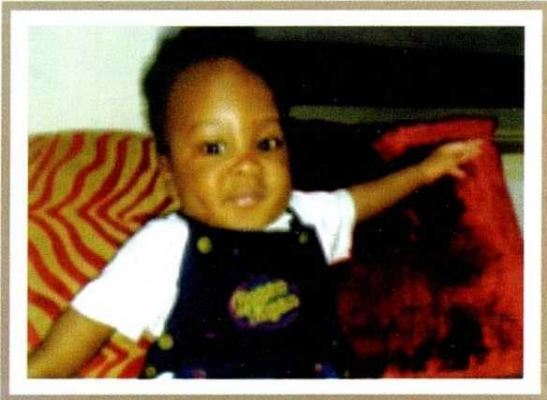
# Births



UNEKWU-OJO DOMINIC AYEGBA, BORN ON 6TH OCTOBER, 2020 TO THE FAMILY OF MR. AYEGBA MARTIN OJOGBANE OF RRD, OTA



ZION Ehinomen Okougaha, born on 27th June, 2020 to the family of Mr. Ferdinand Ayemere Okougaha of SLTD, OTA



MOFE-OLUWA MASON ATAKPU, BORN ON 5TH MAY, 2020 TO THE FAMILY OF MR. DENIS ATAKPU OF EMRD, OTA



BWESHUN BASS JUKU, BORN ON 12TH JUNE, 2020 TO THE FAMILY OF MRS. UHAM BASS OF PITD, JOS.



FEYISAYO ABOLUWARIN, BORN ON 20TH SEPTEMBER, 2020 TO THE FAMILY OF MR. ABOLUWARIN TOBI OF RRD, OTA.



JAYNA JEROME BORN ON 2ND MAY 2020 TO THE FAMILY OF MRS. AYEDIME JEROME OF CESD, ABUJA



JANELLE ABAHI OBEYA, BORN ON 15TH OCTOBER 2020 TO THE FAMILY OF MRS. FAITH OBEYA OF CESD, ABUJA

# NIGERIAN BUILDING AND ROAD RESEARCH INSTITUTE (NBRRI)

(Federal Ministry of Science and Technology)

MEETING YOUR LOCAL CONTENT NEEDS IN CONSTRUCTION

Some Tested R&D innovations from NBRRI currently used in affordable Housing delivery and Road construction in Nigeria.



ROAD FAILURE ACCESSIONMENT



CONSTRUCTION OF RURAL ACCESS ROAD



NBRRI-HYDRAFORM



NBRRI BLENDED POZZOLANA CEMENT



ASPHALT MAT



BAMBOO PANEL FOR FLOORING



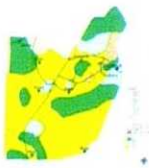
IMPROVED NBRRI TECHNOLOGY (MOVEABLE STOREY BUILDING)



NBRRI POZZOLANA PLANT, OTA



NBRRI SKILLS ACQUISITION CENTRE



ENGINEERING SUBGRADE SOILS ATLAS OF NIGERIA



CHEMICAL TESTING MACHINGS



CONSTRUCTION MATERIALS/SOIL TESTING LABORATORY EQUIPMENT

## Promoting Alternative Indigenous Technology

### Other Services Provided:

- Engaging in regular R&D in the construction industry.
  - Conducts training programmes on the use of alternative technologies in affordable housing delivery and road construction to professionals and tradesmen.
  - Consultancy and Advisory Services on all aspects of the construction industry including site investigation, soil testing land use planning, building road design, construction and maintenance, housing delivery and estate development, etc.
  - Community-Based Construction and Maintenance of Feeder/Access Roads.
  - Organizes annual conference/workshop on topical issues as it relates to the construction industry
  - Investigation of collapsed building across the country and other research findings.
- (The reports can be purchased at any of the NBRI offices across the country)

For more information, please contact:

**DIRECTOR-GENERAL/CEO, NBRI**

**ENGR. PROF. SAMSON DUNA, MNIEEM, RE(COREN), FNICE, FNSE**

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**NATIONAL CENTRE FOR CRAFTSMAN & Pozzolana Production Centre**  
Bot - Bokkos, Km 5, Bokkos - Mangu Road, Bokkos, Plateau State

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Lagos State

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Akwa Ibom State

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Anambra State

**North Central:**

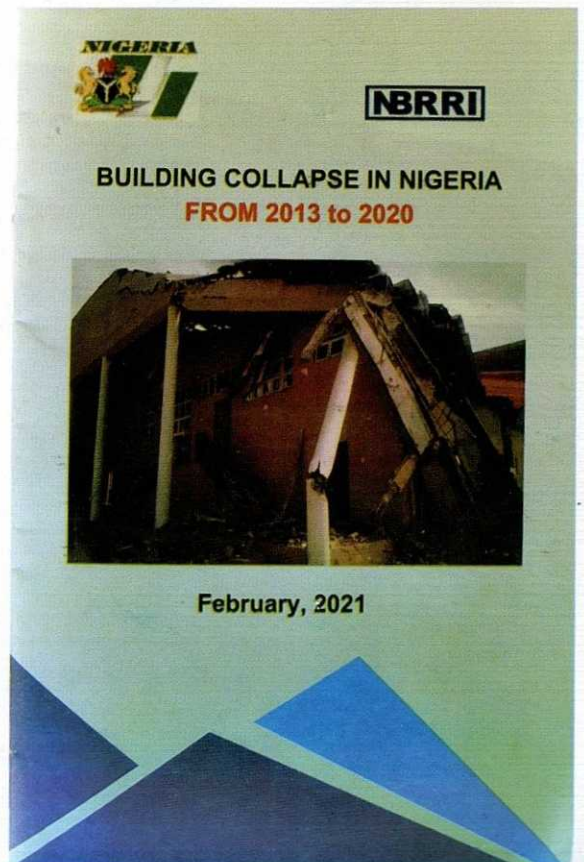
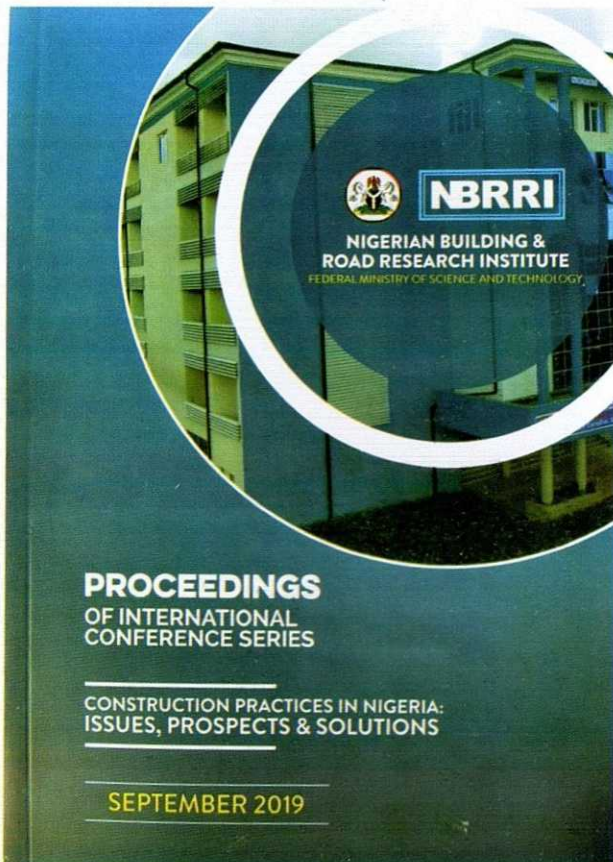
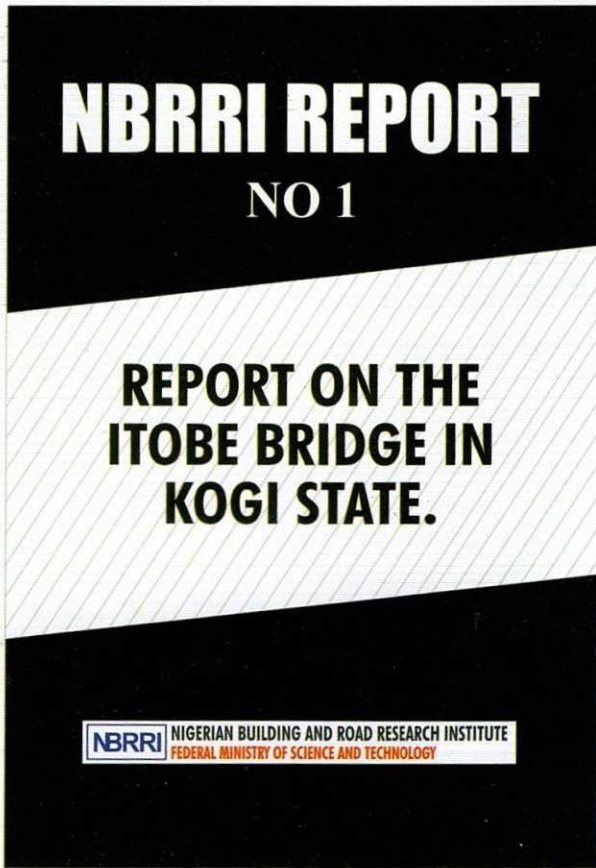
No 2, Wase Road  
GRA, Jos, Plateau State

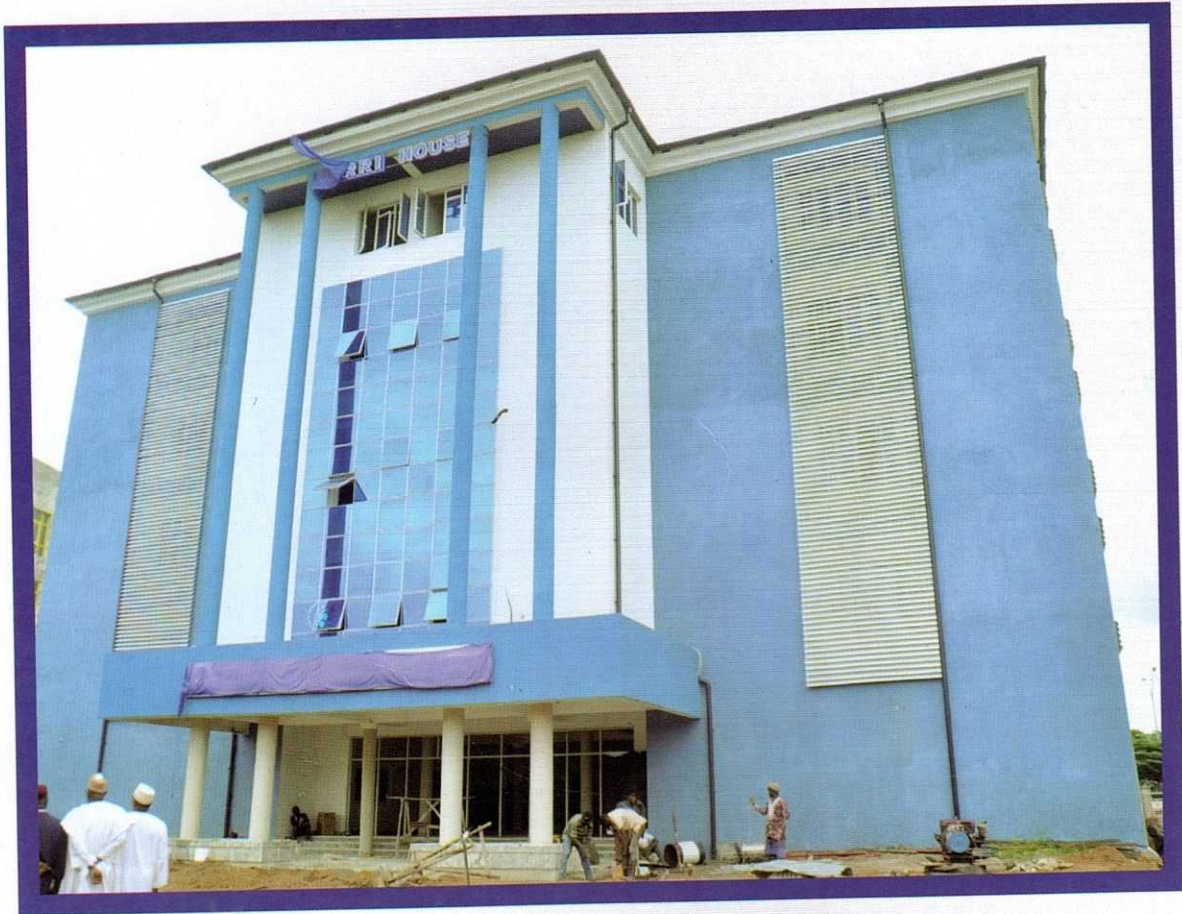
**North East:**

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