International Journal of Advances in Scientific Research and Engineering (ijasre)

E-ISSN : 2454-8006

DOI: 10.31695/IJASRE.2023.9.7.4

Volume 9, Issue 7
July - 2023

Housing Development: A Technical Review of a Four Bedroom Bungalow designed for a client in Bayelsa state, Nigeria

***Chinedu U. Oluigbo[1], Ufuoma O. Georgina[2], Dumbari V. Nnaa[3], Eberendu U. Augustine[4]**

[1-2]University of Africa Toru-orua, Sagbama, Yenagoa, Bayelsa State

[3]Department of Architecture, Niger Delta University, Wilberforce, Bayelsa State, Nigeria

[4]Department of Architecture, Imo State University, Owerri, Nigeria

ABSTRACT

Standing erect on the serene low terrain of the Opolo-Elebele bush, Kpansia-epie, Yenagoa, Bayelsa Road is a four-bedroom bungalow designed for Mr. Patrick Nweke. The concept of the building is drawn out of the minimalist principle of the modern architectural style. The building is composed of three bedrooms with a guest room attached to it. The whole process started with a design brief whose qualitative analysis gave rise to the development of the design proposal for the project. Specifically, this study tends to uncover the challenges posed by this project design and how they were addressed. It also x-rays recommendations to adopt for effective delivery of projects of such scope and characteristics.

Keywords: Bungalow, Design, Project delivery, Process.

1.0 INTRODUCTION

This study is on a residential development (a bungalow of four bedroom dwelling units). The building is designed to house three (3) bedrooms for the client with a guest room, separated from having direct and maximum spatial relationship with other rooms to promote privacy and security. It is characterized by a comfortable lounge, a spacious kitchen and unique architectural character. This study underscores the review of this selected residential development which is laden with the documentation of the design deliverables that characterize the project from inception to preparation of construction drawings for tendering.

1.1 Details of the Residential Building

- ✓ *Project title*: A Four Bedroom Bungalow
- ✓ *Client*: Mr. Patrick C. Nweke
- ✓ *Location*: Off Opolo – Elebele Road, Kpansia - Epie, Yenagoa L.G.A, Bayelsa State
- ✓ *Duration:* 10th January 2016 – 18th June, 2016

2.0 REVIEW

2.1 Inception

In January, 2016, the client stated his intention of developing one plot of land (15m x 30m) to accommodate a four-bedroom bungalow.

2.2 Brief taking

In this stage, the client qualitatively provided the data for the design of this residential building. A preliminary site visit was conducted to ascertain and analyse the nature of the site conditions. More so, the client was communicated on the activities of Bayelsa State Planning and Development Board as well as the need to adhere to the laid out building approval process to be able get all corresponding certifications. The architects requested from the client; the survey plans, design brief and letter of engagement which were provided for the commencement of the design process. The architects further relayed to the client on the

need to consider meteorological patterns in the design of buildings in Bayelsa State as the Fifth Assessment report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) affirms that climate change is occurring globally [1].

a. Project Feasibility and Local Authority Ordinances:

Structurally and economically this project was stable given that the project is situated on a plain. Its location agrees with the residential building zone mapped out by Bayelsa State Planning and Development Board (BSPDB) which was formally Capital City Development Authority (CCDA). In addition, flood, weather and climatic patterns were observed. The report thereto shows that the location of the development (tropical monsoon climate) is characterized by high rainfall and humidity up to nine months in a year (March to November). This factor contributes to large volume of water which will affect the proposed site area. To add up to constraints the site location will face is the issue of flooding and poor surface drainage within its environment [2]. Amidst these constraints, the proposed project boosts of 72% feasibility as the architects assures the client that proposed building will be designed to respond to climatic and environmental issues attributed to the site location.

b. Spatial requirement:

- ✓ An Entrance porch
- ✓ A Waiting room with a visitor's toilet
- ✓ A sizeable lounge and dining room
- ✓ A Guest room secluded from having direct access to other rooms
- ✓ A spacious kitchen
- ✓ Spacious three (3) other bedrooms (with the conveniences en suite) in which one of these three will pose of special features that will make it the Masters bedroom
- ✓ A Verandah linked the kitchen.

c. Timing / Programming guidance:

Based on the submission of the client, he wanted the project to be completed not later than the 30th of October. 2016.

d. Target users: An Average family size of 6.

e. Consultants Required:

i. Architect ii. Land surveyor ii. Quantity Surveyor

iii. Structural engineer iv. Mechanical engineer

v. Electrical engineer

f. Challenges arising from the briefing process:

- Educating the client on the need for the complete services of the Architect and other allied professionals in the built environment.

The client presumed the architect is only involved to just design the building project and that's all. Admittedly, he (the Client) has sole power to directly involve technicians to handle other aspects of the building projects without consulting the Architect.

g. How it was addressed:

- Exposing the client to some practical risks of involving non-professionals in a building project without the consent of an architect.

2.3 Concept design

The concept of the design was directed by the client's brief which represented a typical residential development of its type of zoning in terms of public, semi-private and private areas. The design approach was from a minimalist point of view and in consideration of the client's emphasis on a design void of elaborate ornamentations. Later on, the concept design was developed into a proposal and presented to the client by the first week of February 2016.

DOI: 10.31695/IJASRE.2023.9.7.4

Without much correction the client approved the design. An endorsement was done as sign off of the concept design of the building facade by the client and go ahead to proceed with the design was approved by him.

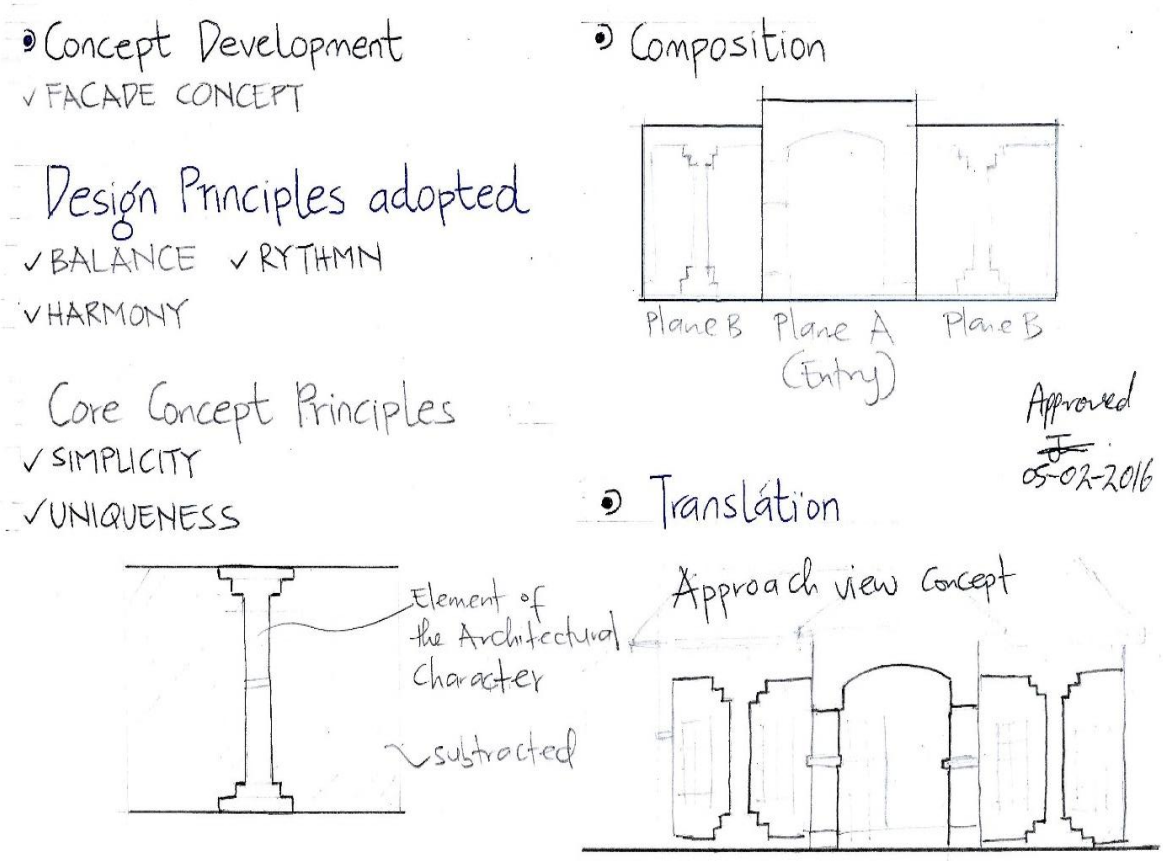

Figure 1: Generation of design concept for Case study

How a concept designs off should have been carried out to improve the process:

- Back and forth process with other key players of the design/construction team should be encouraged and sustained.

2.4 Consultants selection & coordination

a. Process for appointing consultants for this project and client involvement:

Due to the rigid nature of the client towards the involvement of consultants for this project, he insisted on being the one to involve other consultants. Admittedly, there was a rough relationship between me and other consultants which were selected by the client because of his failure of formally relating the other consultants to me.

b. Problem arising from the chosen consultants:

i. Weak submission of some consultants to architects instructions:

The consultants were not ready to liaise with the architects in producing an efficient design for the client as they claimed they were solely selected by the client.

This nevertheless affected extent of supervising inputs from the other consultants during the concept design stage.

c. How it was addressed:

The architects have to diplomatically follow up the other consultants, advising the client on the need for the synergy between the architect and other consultants so as to achieve an all-inclusive design via an integrated design approach.

DOI: 10.31695/IJASRE.2023.9.7.4

d. How a proper process of appointing of consultants should be done:

i. In the case the client appoints / selects consultants for a project, a formal introduction should be rendered in a Design Consultants Meeting (DCM) with the utmost need to promote collaboration and teamwork among all the consultants. This will in turn stimulate and enhance the project delivery.

ii. Architects should be allowed to recommend the consultants to work with in a particular project without prejudice and more importantly, only fully licensed and qualified consultants with specialty in concerned fields required in a project should be selected.

Figure 2: Three dimensional views of Case study

2.5 Design development

This design stage II was led by the architects who developed the design and communicated same to other members of the design team. The client was first communicated the design which was approved by the clients after series of modifications. Owing to the clients sign off of the developed design after making right all the corrections by the architects, the developed designs were communicated to other consultants to make their inputs and come up with their respective designs. The outcome of the inputs of other consultants led to certain modification in the design by the architects. In the design of this residential development, one of the major considerations was natural ventilation. It was accepted that natural ventilation with a good design is acceptable and applicable to many types of buildings from low-rise dwellings to high-tech office buildings [3]. Incorporating natural ventilation techniques into building design process requires time and expenses during the design stage, but the eventual reduction in energy demands and cost of purchasing and maintaining mechanical equipments, as well as better worker efficiency would pay off as a more healthy and sustainable building compared to the typical ones that seals itself from the environment [3].

a. Challenges arising from lack of proper sign-off developed design and how they were addressed:

i. Insufficient documentation on proper sign off of the developed design.

DOI: 10.31695/IJASRE.2023.9.7.4

b. How it was addressed:

i. Persistence in developing design drafts and taking photographs in other to get details.

b. How a developed design signs off process should have been carried out to improve the process:

- The client should be properly guided to mitigate or avoid abrupt disruption of the design development process with lots of "after-thought" padded with irregular display of clients taste / desires.

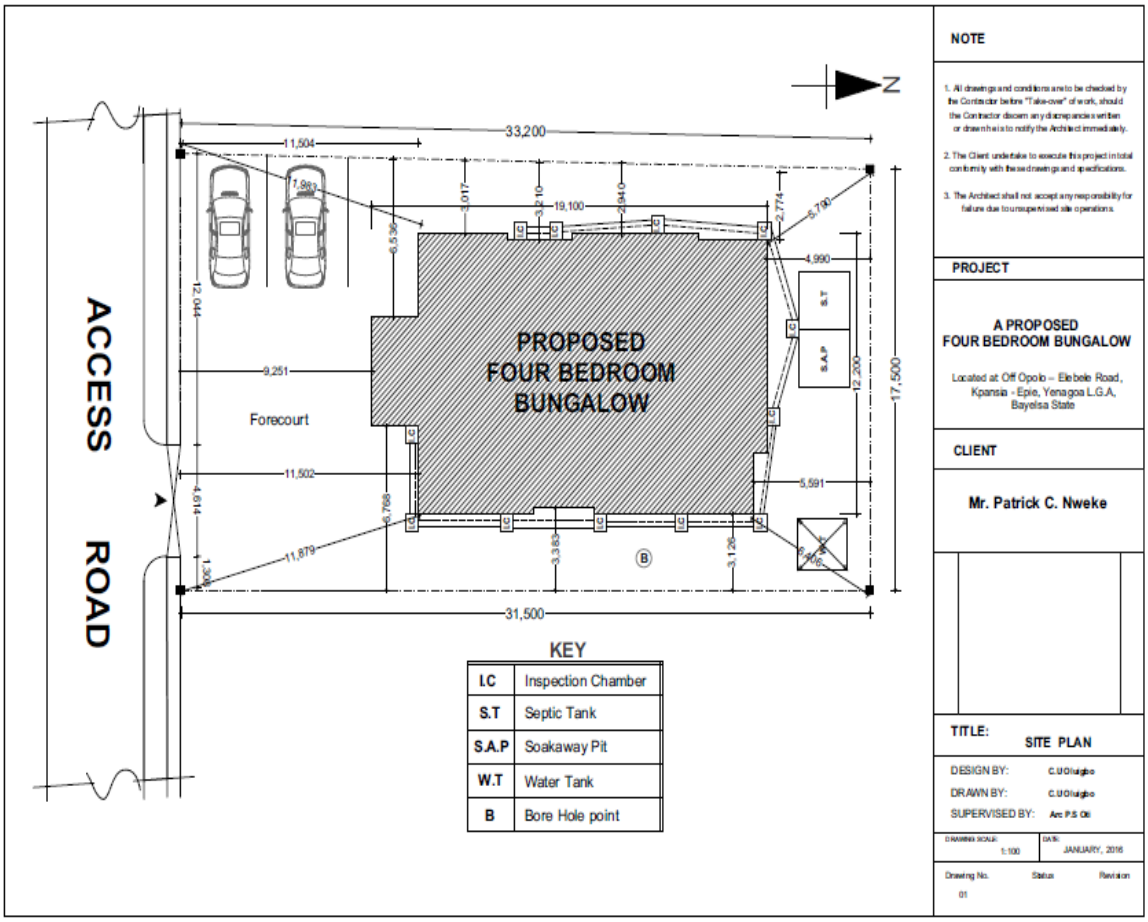

Figure 3: Site plan of Case study

DOI: 10.31695/IJASRE.2023.9.7.4

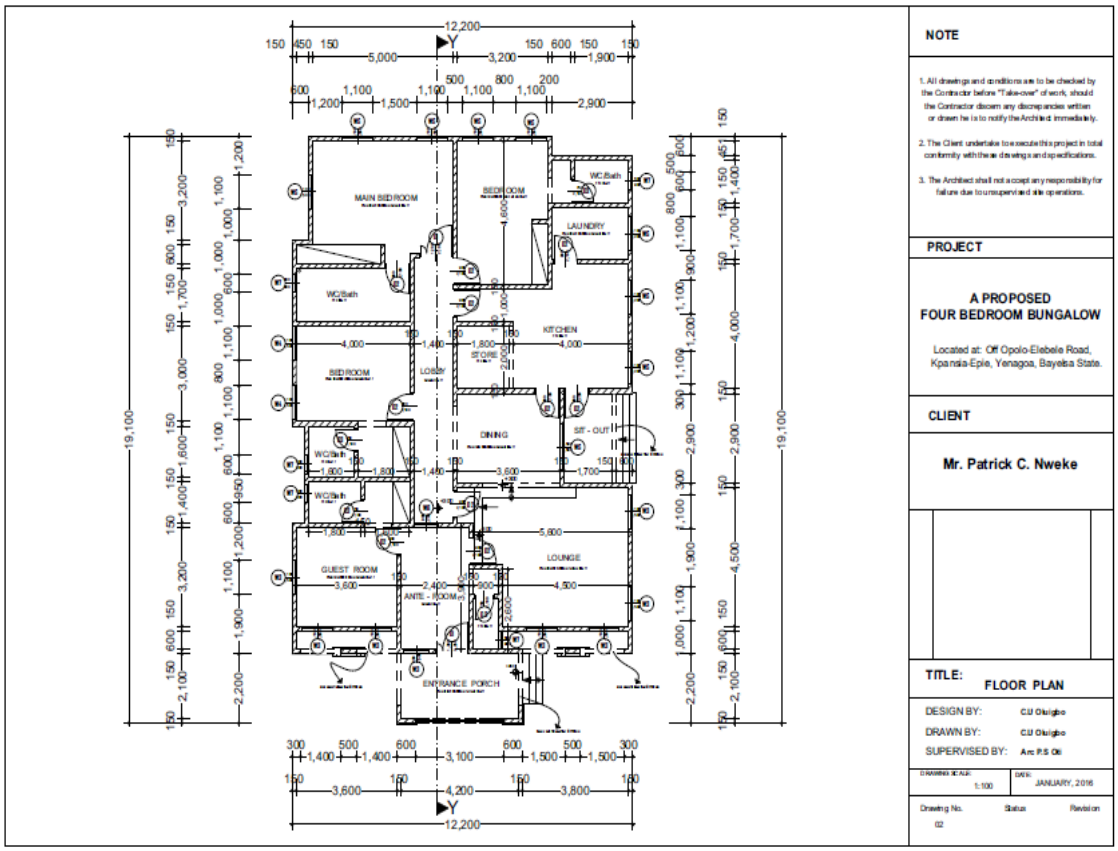

Figure 4: Floor plan of Case study

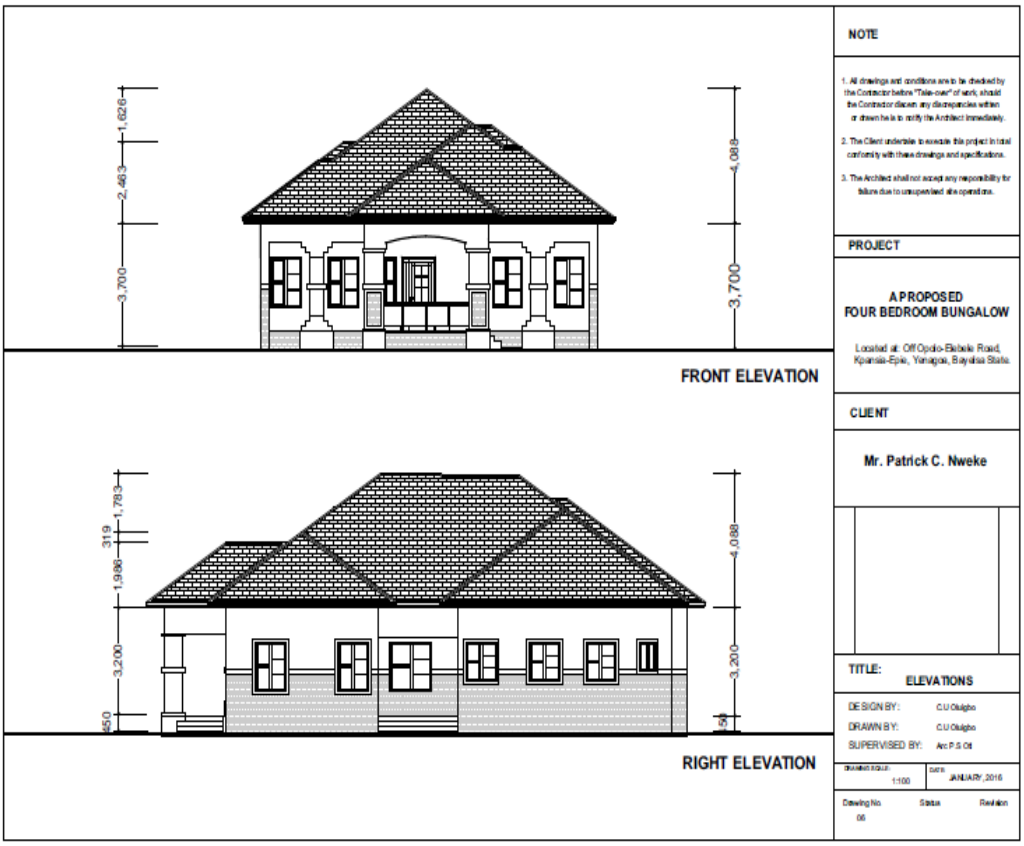

Figure 5: South and North elevation of the Case study

DOI: 10.31695/IJASRE.2023.9.7.4

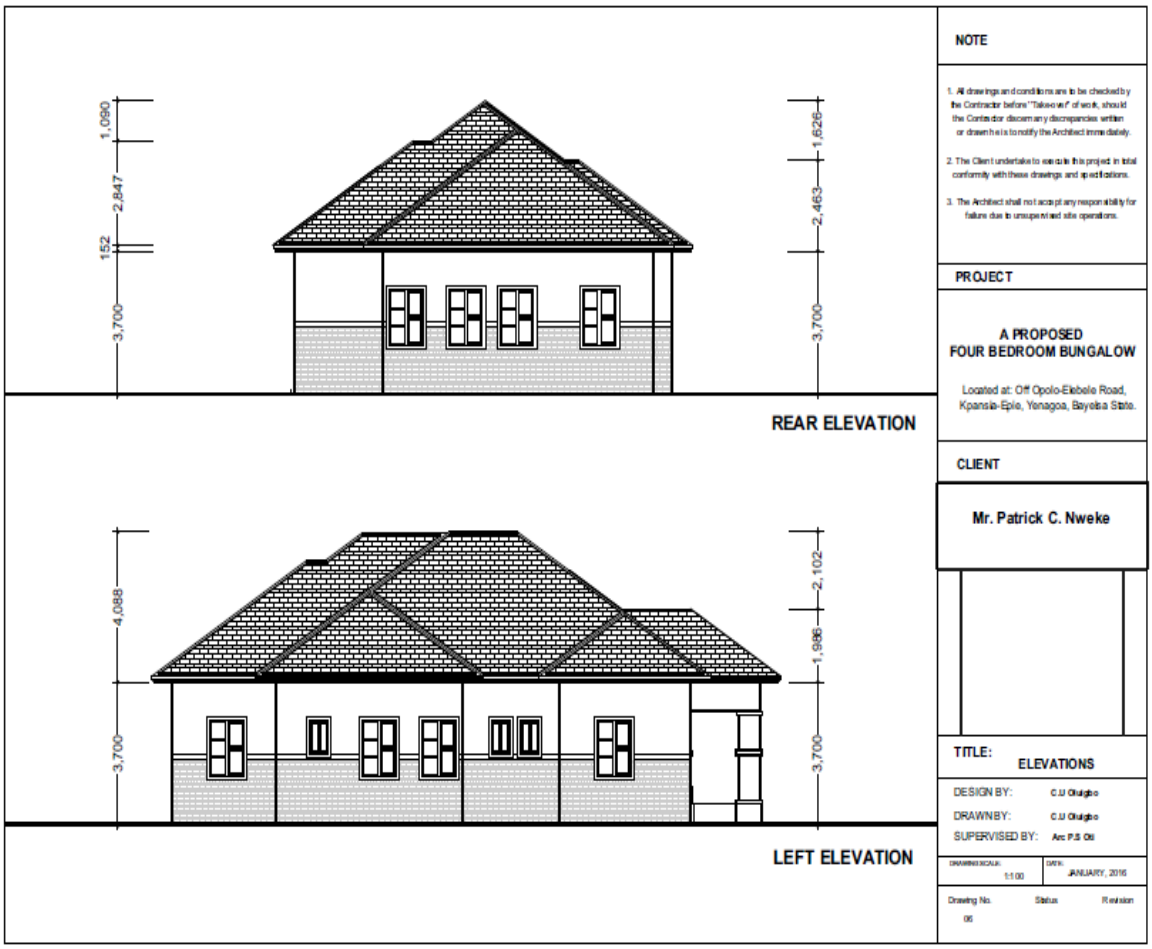

Figure 6: East and West elevation of Case study

Figure 7: Exterior and interior perspectives of the Case study

DOI: 10.31695/IJASRE.2023.9.7.4

Figure 8: Exterior and interior perspectives of Case study

2.6 Specification writing

a. How the specification was agreed with client:

This was agreed upon by the client without any formal documentation buttressed by the fact that the design team will form the construction team.

b. Challenges arising from lack of proper sign-off of design specification and how they were addressed:

- Need to access some special notes on assembly, construction and installation processes.

How it was addressed:

- The consultants involved promised to fully be on ground and available to model solutions for design issues raised in the different fields.

c. Process that will improve Specification writing:

- All consultants (design team) involved in the building project should always collaborate before and during specification writing.

2.7 Budget estimates

a. Development of Preliminary Budgets:

As it demands, after developing the designs the need to estimate the probable cost of realizing the building project surfaced. The contribution from the offer professionals led to the development of these preliminary budgets for the client to review.

2.8 Construction documentation

a. The Construction Documentation Process:

With the client's approval to prepare the construction drawings for the project, the architects ensured the following;

DOI: 10.31695/IJASRE.2023.9.7.4

- All the drawings from the design development phase were thoroughly scrutinized for discrepancies. In the same bearing all variations were made right and communicated to the client for rectification.

- Also, the building code expert ran a thorough check on the code requirements for the four (4) bedroom bungalow including electricity, fire, safety and plumbing as per the compliance guidelines.

Having met all the design requirements, the complete construction drawings were prepared by the design team and reproduced in six (6) sets of drawings with three (3) tendered for the approval process, 2 (two) for the client and contractor respectively while one was reserved as the architects copy.

2.9 Tender process

a. Form of Tender used - *Selective tendering*

This Selective tendering allowed Suppliers to submit tenders based on the invitation of the client. A pre-selected list of possible suppliers was prepared that are known by their track record to be suitable for a contract of this size and nature among which Landmark Engineering Services Limited emerged as the selected bidder. From the tenders received, the preferred tender is selected based on price and quality and negotiations entered into.

This Selective tendering gave the client greater confidence that his requirements will be satisfied and reduced the wasted effort that can be involved in open tendering.

3.0 CONCLUSION, AND RECOMMENDATION

3.1 Conclusion

As the project required, the consultants involved in all the stages of the project particularly the design development and construction documentation stages aimed at producing an all-inclusive design

a. Deductions:

i. It is assuring to get the attention of clients to sign off every stage of the project life–cycle. To achieve this Prime Consultants should ensure maximum communication with clients and create clear avenues where every input on a project is relayed to the client.

ii. In as much as the Architect plays out his/her creativity in a project, he/she should be conscious of the cost implication of the deliverables they propose for a project to ensure the project cost budget as presented by a client is met.

b. Experience with the use of Reinforced Concrete:

One of the major materials used for construction works on daily basis is concrete due to its good strength, development and durability [3]. This project x-rays the handling of concrete is one of the most commonly encountered activity in the construction of buildings in Bayelsa State, Nigeria as evidenced in the following areas:

Mixing, Formwork, and Curing of concrete:

Here, observation shows that batching of concrete by volume should not be mathematically restricted to the batching ratio of (1:2:4 for reinforced concrete), (1:2:6 for mass concrete) but due consideration should be given to the particle size of the aggregate amongst other considerations which could impact the batching ratios to used construction. More so, this review revealed that to aid a perfect and smooth compacting and forming of concrete, the nature of the material / boards used is key taking cognizance of the fact that concrete should be pliable and vibrated. In curing the concrete, the formwork of the concrete should be allowed with the concrete to maximize the strength of concrete.

Concrete curing and testing:

The concrete samples were prepared to be demolded after 24 hours' rest period after casting. The samples were then cured on a concrete curing tank and tested after 7, 14, 21, and 28 days.

The following tests were performed on the concrete:

i. Workability: This was done using the slump test method on the fresh concrete as reported in BS 1881-102 (1983).
ii. Compressive strength: Concrete cubes of 100 mm were produced and tested with the universal testing machine (UTM) in line with BS 1881-116 (1983) after curing.

DOI: 10.31695/IJASRE.2023.9.7.4

iii. Splitting tensile strength: Concrete cylinders of 100 mm by 200 mm were casted and tested with UTM in accordance with BS 1881-117 (1983).

iv. Flexural strength: Concrete beam specimens of 100 mm by 100 mm by 500 mm cross-section were casted and tested in accordance with BS 1881-118 (1983).

3.2 Recommendation

1. Architects should ensure that they are properly engaged, appointed and committed before taking up the responsibility to render services to clients to avoid watering down the reputation and dignity of the architectural profession.

2. A preliminary visit or inquiry should be carried out in any relevant planning and development authority within the geographical location of proposed projects to draw out key information about the proposed site area that will shape the design and execution of the project. Such information includes; allowable building height, building type and configuration, recommended setbacks and easements, foundation type for location, occupancy ratio and capacity etc.

3. Generally, architects should unite and ensure a holistic recognized scale of fees for architectural services are strictly adhered to by all architects in any locality to protect and preserve the architectural profession.

REFERENCES

[1] Intergovernmental Panel on Climate Change. (2015). Climate Change 2014: Mitigation of Climate Change: Working Group III Contribution to the IPCC Fifth Assessment Report. Chapter 9, Pg. 675. Cambridge: Cambridge University Press. DOI: 10.1017/CBO9781107415416.

[2] Ferdinand O. D. and Anthony D. E. (2015), Climate Change and the Increasing Risk of Flooding in the Built Environment. J. of Environmental Sciences and Resource Management, Vol. 7, No. 1, Pp. 30– 39)

[3] Kim H. (2016). Study on Integrated Design Workflow for Natural Ventilated Tropical Office Building Using CFD. J Archit. Eng Tech 5: 170. DOI: 10.4172/2168-9717.1000170

[4] BS 1881-102 (1983). Testing of Concrete: Slump Test, British Standards Institute. London, United Kingdom.

[5] BS 1881-116 (1983). Testing Concrete. Method for determination of compressive strength of concrete cubes. British Standards Institute. London, United Kingdom.

[6] BS 1881-117 (1983). Testing Hardened Concrete. Splitting tensile strength of test specimens. British Standards Institute. London, United Kingdom

[7] BS 1881-118 (1983). Testing Hardened Concrete. Flexural strength of test specimens. British Standards Institute. London, United Kingdom.

*chineduoluigbo@uat.edu.ng

DOI: 10.31695/IJASRE.2023.9.7.4