A TECHNICAL REPORT ON STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME

(SIWES)

UNDERTAKEN AT BRICKHOUSE CONSTRUCTION & CO. LIMITED.

26, FOLA OSIBO ROAD, LEKKI PHASE I, LAGOS STATE.

BY

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DEDICATION

This report is dedicated to Almighty Allah for sparing my live throughout the SIWES programme.

Also dedicated to my darling and lovely parents, for their financial support since the beginning of this programme. May Almighty Allah grant them their heart desires and find favour in wherever they are. Amin.

Also to my lovely families and friends for their guidance, support and moreover their advice been given, may Almighty Allah see you through your days in joy and complete happiness (AMEEN).

ACKNOWLEDGEMENT

I acknowledge with gratitude to Almighty Allah for successful completion of SIWES and making this SIWES a reality.

I appreciate the effort of my lovely parents, who had supported me in all aspects of my lives. I am grateful to them for sending me to acquire greater knowledge sound education. May you live long to reap what you have sawn.

I am grateful to my Supervisor for his unrented effort, support and encouragement. Also my appreciation goes to all staff of Civil Engineering Department who has contributed one way or the other to the completion of this project.

My profound gratitude to my trusted and able Head of Department Engr. Na`Allah and other reliable lecturers.

Lastly, I extend and express my appreciation to my friends for their moral support, I say thank you all, May Almighty Allah guild and bless you All.

ABSTRACT

The report details the author's industrial training experience with BRICKHOUSE CONSTRUCTION & CO. LTD, focusing on practical site works on building especially the structural parts.

The training involved hands-on activities such as setting-out, arranging reinforcement bars, formwork erection, blinding preparation, and foundation block-wall laying.

The report emphasizes the acquisition of technical skills applicable to roles in the construction industry, including site engineer, project engineer, foremen, artisans, and highlights the gained competence for success in the labor market.

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CHAPTER ONE

1.1 HISTORY OF SIWES

SIWES which means **Student Industrial Work Experience Scheme** is a compulsory skills training programme designed to expose and prepare students at Nigerian Universities, Polytechnics, Colleges of Education, Colleges of Technology and Colleges of Agriculture, for the industrial work situation they're likely to meet after graduation.

The scheme also affords students the opportunity of familiarizing and exposing themselves to the needed experience in handling equipment and machinery that are usually not available in their institution.

Before the establishment of the scheme, there was a growing concern among industrialists that graduates of institutions of higher learning lacked adequate practical background studies preparatory for employment in industries.

Thus, employers were of the opinion that the theoretical education in higher institutions wasn't responsive to the needs of the employers of labor.

The Industrial Training Fund (I.T.F) did SIWES introduction, initiation and design in 1993 to acquaint students with the skills of handling employer's equipment and machinery. The Industrial Training Fund (I.T.F) solely funded the scheme during its formative years.

However, because of financial constraints, the fund withdrew from the scheme in 1978. The Federal Government, noting the significance of the skills training, handed the management of the scheme to both the National Universities Commission (N.U.C) and the National Board for Technical Education (N.B.T.E) in 1979.

The management and implementation of the scheme was however, reverted to the I.T.F by the Federal Government in November 1984 and the administration was effectively taken over by the Industrial Training Fund in July1985, with the funding solely borneby the Federal Government.

1.2 BODIES INVOLVED IN THE MANAGEMENT OF SIWES

The bodies involved are:

- Industrial Training Fund (ITF).
- The Federal Government.

Other supervising agents are:

- National Council for Colleges of Education(NCE)
- National University Commission(NUC)
- National Board for Technical Education(NBTE)

The functions of these Agencies above include;

- Establish SIWES and accredit SIWES unit in the approved institutions.
- Formulate policies and guideline for participating bodies and institutions as well as appointing SIWES coordinators and supporting staff.
- Supervisestudentsattheirplacesofattachmentandsigntheirlob-bookandIT forms.
- Ensure payment of allowances for the students and supervisors.
- Ensure adequate funding of the scheme.

1.3 AIMSANDOBJECTIVESOF SIWES

- Prepare the students for the industrial work situation they're likely to meet after graduation.
- Expose students to work method and techniques in handling equipment and machinery that may not be available in their institutions.
- Provides the avenue for students in institutions of higher learning to gain industrial skills and experiences in their course of study.
- Make the transition from school to the world of work easier and enhance students' contact for later job placement.

CHAPTER TWO

COMPANY PROFILE

2.1 BRIEF HISTORY OF THE ORGANIZATION

BRICKHOUSE construction & co. Ltd is located at *Fola Osibo road, Lekki Phase I, Lagos State.* It was incorporated as a limited liability company in March 2010.

The company was Established by Managing Director because of the realization that Nigerian construction professionals should take the bull by the horn and dictate the pace for the complete development of the construction and real estate sector of the economy. Because of the competitive nature of the terrain of business, the Organization is aware that for indigenous engineering companies to survive, a complete re-orientation of the erstwhile Nigeria approach to business must be embraced.

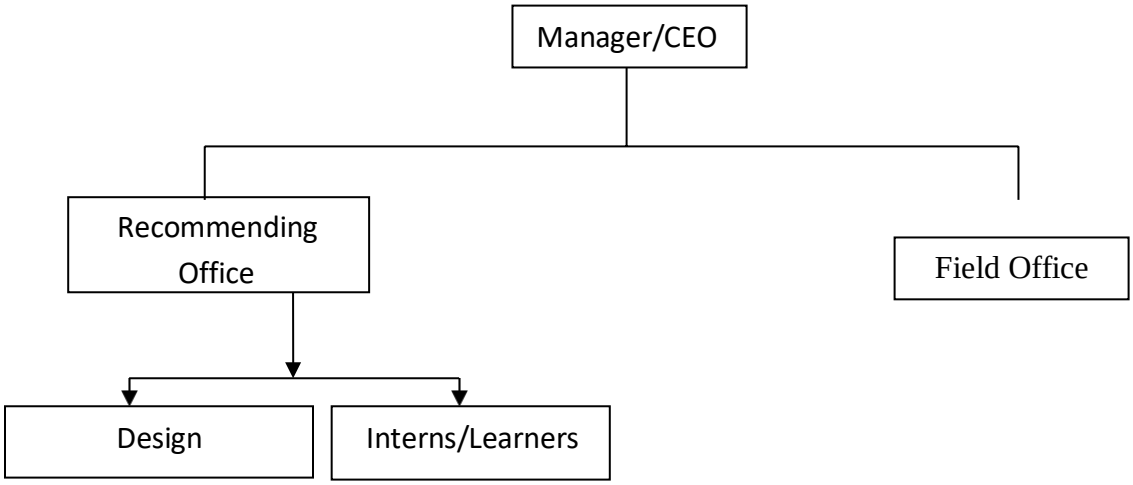
To this end, the organization's subscription to Total Quality Management is unsurpassed consequently therefore matters such as;

- Conducive business environment.
- Competitive pricing.
- Employees and Public safety.
- Commitment to ultimate quality.
- Staff welfare
- Commitment to project on- time delivery.
- Effective management techniques have become second nature to my organization.

BRICKHOUSE Construction Ltd provide and deploys the best in class project management techniques and procedures in executing all projects to the highest standard Projects undertaken include Construction, Engineering and

Architectural Design, Interior Decoration, Procurement and Consultancy to both private and corporate clients in Nigeria.

2.2 ORGANIZATIONAL CHART



2.3 VARIOUS DEPARTMENTS IN THE FIRM

1. Managing Office
2. Recommending Office
3. Field Office
4. Design Coordinators
5. Interns/Learners

CHAPTER THREE

EXPERIENCE GAINED

3.1 Triplex Building

Triplex apartment is a building that combines three separate residential units into one structure, with the various apartments sharing one or two common walls. Every unit in a triplex has its own bathroom(s), kitchen, living room, exterior doors, and address.

A triplex is a three-unit residential structure with a single owner, akin to a duplex or fourplex.

While a triplex is made up of three separate residential units incorporated into one structure, the units usually share one or two common walls. Each habitation area in a triplex is self-contained.

Some triplexes are built specifically as triplexes, while others may have started out as a big single-family residence that was later partitioned into three independent dwellings.

3.2 INTERPRETATION OF STRUCTURAL DRAWING

Introduction to How to read structural drawings

Structural drawings are the essential maps of construction projects, but decoding them can be daunting. As a professional, understanding these blueprints is crucial. In this guide, we'll simplify the process, empowering you to navigate through structural drawings with confidence.

The first step toward the preparation of the bar bending schedule is to consult, arrange and organize the drawings.

The principal purpose of drawings is to provide accurate detail and measurement of each component of the finished product. This blueprint is a key document that enables contractors to execute any activity on site. Nowadays, the three most common types of structures built are steel structure, concrete frame structure and wooden structure. In this article, we will discuss concrete frame structure.

Interpreting structural drawings means understanding the detailed information depicted on a plan, which outlines the load-bearing elements of a building, including their size, location, material type, and reinforcement details, essentially showing how the structure will withstand various forces and remain stable; this information is crucial for construction professionals to accurately build the building's supporting framework.

Aspects of interpreting structural drawings:

1. Identifying structural elements:

Recognizing components like columns, beams, slabs, walls, foundations, and their connections on the drawing.

2. Understanding different views:

Reading and interpreting plans (top view), elevations (side views), and sections (cut-away views) to fully grasp the structure's layout and details.

3. Reading symbols and notations:

Deciphering the symbols used to represent materials, reinforcement details, dimensions, and other critical information on the drawing.

4. Material specifications:

Determining the type and grade of materials used for each structural element, like concrete strength or steel grade.

5. Load-bearing details:

Analyzing how loads are transferred through the structure by examining the size and placement of beams and columns.

6. Cross-referencing with other drawings:

Consulting architectural drawings to understand the relationship between structural elements and the building's overall design.

General Arrangements plan

It comprises a key plan that identifies the site location the outlines of the building works in relation to the wider context of the area where construction work will carry out.

3.3 Arrangements of Reinforcement

Principle of rebar arrangement

i. The worker measures the real length between beams and arranges the reinforcement bars consulting the drawing, main bars in the short direction and sub. bars in the long direction.

ii. Bent bars at the top should be extended into the exterior beam reinforcement, and be sure for the bars at the top and bottom to be hooked and tied considering tensile and compressive force to slabs.
It is not allowed if you put on slab upper part rebar as it is or put into the beam fewer than 10D of rebar thickness of lower part rebar.
Slab bar arranges over 80mm space from side of beam bar. (There is no need to fixing by bending if you can get fixed length from end of beam). The arrangement in slabs should be in accordance with the drawing and be sure not to bend if it is web reinforcement.

iii. It is quite advised to use spacer and bar support to keep the required shape and strength, and tie the reinforcement every other grid. The placement of concrete should be conducted after all the reinforcements and ties are assured.

iv. In case the thickness of slab is 120mm, the height of bent bar should be 60mm. Use bar support in order to maintain the space between bars at the top and bottom and then the distance will be correct. Lower part bar will be worked by maintaining cover with spacer.

v. Tie the bars at the top and the bottom irrespectively. Tying the bars is conducted in alternate and do not let the tying positions coincide with each other, so that the bars at the top sustains upper loads and the bars at the bottom handles undesirable loads.8

Check after assembling slab

After construction of slabs, the supervisor should check following matters.

i. Are pillars of adjacent floor(usually upper floor) well positioned having intended dimensions?
ii. Is cover depth of slab well distributed and balanced?
iii. Is there any abnormally inclined bent bar?
iv. Are spacer and bar support rightly installed to be strong bar splice all right?
v. Is slab Bar splice all right?

vi. Is reinforcement at the opening acceptable?
vii. Enough splice length to the next floor?

Any dissatisfaction with items above will lead to poor construction and safety problems. In particular, if it is the matter of columns, it is very difficult to rebuild it and has poor appearances.
And it is also an economical burden to the builder.

3.4 BUILDING AND CONSTRUCTION PROFESSIONALS

1. Land Surveyors:

Land surveyors are the first professionals you must work with in the construction and building of houses in Nigeria.

They measure and map out land features using advanced equipment and techniques.

Also, they determine property boundaries, identify elevations, and locate the best site for construction.

They provide accurate information on existing features, such as roads, utilities, and structures.

It is important to work with land surveyors because they ensure you are in compliance with local regulations.

So, working with a land surveyor can help prevent legal disputes, costly mistakes, and delays in construction.

2. Architects:

An architect is a building professional who designs and plans buildings, ranging from homes to skyscrapers.

His/her job is to create functional and pleasing structures that meet the needs of their clients.

They can help you develop a customized design that suits your specific needs and preferences while ensuring safety.

Architects also act as project managers, overseeing the construction process and ensuring that the building is being constructed according to the design and plans.

This way, you navigate the complex permit and regulatory processes involved in building a new structure, which can save you time, money, and headaches in the long run.

3. Civil Engineers:

Civil engineers are building professionals who design, plan, and oversee the construction of buildings, roads, bridges, and other infrastructure projects.

Their job is to ensure that structures are safe, stable, and functional for their intended use.

When building a house, it is important to work with civil engineers, as they bring valuable expertise in structural engineering, site analysis, and construction management.

With many people selling building materials online, you can expect you need guide choosing the best.

They can help ensure that the building is structurally sound, meets building codes and regulations, and can withstand environmental disasters.

Civil engineers can also help you optimize your building design for energy efficiency and sustainability, which can save you money on energy bills in the long run.

4. Bricklayers and Masons

Bricklayers and Masons are building professionals in the handyman services category who work with bricks, stones, and other masonry materials to construct buildings.

They are skilled craft workers who can create sturdy walls, chimneys, fireplaces, and other architectural features using their expertise in laying and joining masonry materials.

Their job is essential in the construction industry as they ensure the structural integrity of buildings.

They work closely with architects and engineers to interpret construction plans, make accurate measurements, and apply proper building techniques.

Working with bricklayers and masons is vital when building a house because they have the knowledge and experience to handle materials properly.

Therefore, it is essential to hire the services of this handyman to ensure that your home meets standards and is safe for you and your family.

5. Welders and Metal Fabricators:

Welders and Metal Fabricators are building professionals who specialize in working with metal to create and join metal parts.

They work with different metals, such as steel, aluminum, and copper, to make a wide range of products like gates, windows, doors, and railings.

In the building industry, it is important to work with these professionals because they play a vital role in creating sound structures.

Welders and Metals Fabricators work hand-in-hand with other building professionals, such as architects, engineers, and builders, to ensure that they complete the project to the highest quality.

6. Electricians:

Electricians are skilled building professionals who specialize in installing, repairing, and maintaining electrical systems.

Their job is to ensure that the electrical systems in a building are safe, efficient, and comply with building codes and regulations.

They work with a variety of electrical equipment, including wires, circuit breakers, troubleshoot and fix electrical problems.

When building a house, it is important to work with electricians to ensure that they properly installed the electrical systems and meet all safety standards.

Electricians can help design and install electrical systems that meet the specific needs of the building, taking into account the size of the structure, occupants, and home smart gadgets and devices.

7. Plumbers:

Plumbers are skilled building professionals who specialize in installing, maintaining, and repairing plumbing systems.

Their job is to ensure that water flows smoothly in and out of a building, as well as maintaining proper drainage and waste management.

Plumbers can help ensure that your home has an efficient and reliable water supply, and proper sewage disposal.

They can also help you choose the right fixtures and appliances that meet your needs and budget.

Plumbers are one of the best building and construction professionals you must work with in Nigeria.

8. Painters:

Painters are professionals who specialize in the application of paint, varnish, or other finishes to a variety of surfaces, including walls, ceilings, furniture, and other building components.

Their job is to transform the look of a building or space by adding color, texture, and protection.

When building a house in Nigeria, it is essential to work with painters as they play a crucial role in ensuring the building looks visually appealing.

Painters possess the skills and expertise needed to select the best paint type and color that will enhance the overall look of the building.

With their expertise and experience, they can help you achieve the desired aesthetic and protect your investment against natural damages.

9. Interior Designers:

Interior designers are professionals who specialize in creating functional and aesthetically pleasing interior spaces.

They are experts in designing spaces that are not only beautiful, but also efficient.

Their job involves planning, designing, and managing the interior decoration of buildings, including homes, offices, and public spaces. Working with interior designers when building a house is important because they help ensure that the design and decoration of the interior spaces meet your needs and desires.

11. Estate Managers:

Estate managers are professionals who oversee the operations and management of residential, commercial, and industrial properties.

They ensure they maintain your properties in compliance with applicable laws and regulations.

It is important to work with estate managers as they possess the expertise to manage and maintain a building, ensuring that it operates efficiently and effectively.

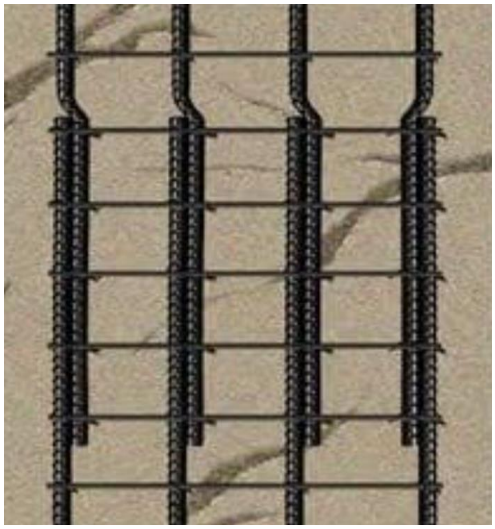
Estate managers can assist building professionals in the planning and design stages of construction by providing input on factors such as security, energy efficiency, and maintenance requirements.

They can coordinate repairs, schedule routine maintenance, and ensure that the building is safe.

In conclusion, building professionals play a crucial role in ensuring the safety, efficiency, and success of construction projects in Nigeria.

3.5 LAPPING LENGTH OF REINFORCEMENT

Steel bars have a 6m length. If length of a bar is not enough to keep the reinforcement, we have to lap two steel bars. Normally, lapping position is at where near the minimum shear force is acting. Normally lap length is 50D meaning 50 times the bar diameter if both bars are of same diameter. When lapping two bars of different diameters, the lap length is considered as 50 times the smaller diameter



3.6 REINFORCED CONCRETE

This is the combination of two dissimilar but complementary materials. Namely concrete and steel. Concrete has considerable crushing strength, is durable, has good fire resistance but offers little or no strength in tension but fair in shear. The other hand steel has good tensile properties, poor resistance to fire (due to rapid loss of strength under high temperature) and very good both in shear and compression. Thus, a combination of these materials results in good tensile and compressive strength, durability and good resistance fire and shear.

3.7 OPERATIONS OF CONCRETE

These are the processes involved in producing a good and suited concrete for the construction of a particular structure. Such as mixing, transporting, placing, compaction and curing.

Batching of concrete materials: this is the process of measuring the amount of materials (cement, fine aggregate, coarse aggregate and water) needed for the production of certain amount of concrete which is either in volume or weight. For example, this is for cement.

Mixing of concrete materials: This is the process of putting together moderate amount of concrete materials manually or in a mixer machine in other to produce what is called fresh concrete and the end result must be homogeneous.

Transporting of concrete: This is the process of moving the fresh concrete from the place where it is mixed to where it will be placed.

Placing and compaction: this is the process of preventing voids in concrete by vibrating which helps to pack the ingredients together with the use of poker vibrator and other instruments.

3.8 COLUMN KICKER

Column Kicker is a small concrete step used at the bottom of columns or walls to make sure that correct coordinates of columns or walls are maintained between floor slabs. So, a column kicker should be used at all positions where columns or walls are constructed. After the construction of the kicker is completed, then the formwork of columns or slabs can be placed immediately, and the kicker will guarantee exact column base alignment and location.

3.9 STIRRUPS

Stirrups are mainly provided for holding the main reinforcement of beam. It prevents the buckling of beam and also protect the RCC structure during seismic activity. Stirrups providing protection against flexural and shear failure as shown in figure.

Purpose

- It gives shear strength to the beam.
- It gives confinement to the beam & increases its comp strength.
- It prevents the movement of main bars at the time of concreting.
- It enhances ductility.
- It resists lateral shear.
- It gives stability to the r/f.
- It prevents bucking of member & also of individual bars.

3.10 CUBE TEST

This is standard method of determining the compressive strength of concrete. It involves casting concrete into cubical molds and then subjecting them to compressive loading until they fail. The compressive strength is then calculated from the load at which the cube fails.

PROCEDURES

1) Forming: freshly mixed concrete is poured into a cubical molds of standard dimensions typically 150mm on each side. The molds are then vibrated to remove air pocket and ensure uniform mixture.
2) Curing: the cast cubes are cured under controlled condition to allow the concrete to harden properly. The curing process typically involves storing the cubes in a moist environment, such as a water tank or a curing chamber, for a specified period, usually 7, 14, 28 days.

3) Testing: after the curing period the cubes are carefully removed from the molds and transported to the Testing machine. The testing machine applies compressive load gradually on the cyber until it fails. The failure load is measured in megapascal or kilogram per centimeter square (kg/cm^2).

4) Calculating compressive strength: the compressive strength of concrete is calculated from the failure load and the dimensions of the cube. The standard formula is;

F.C= 2*P/(L*B*H)

RECOMMENDATIONS

Based on the experience and knowledge acquired at the course of the SIWES training, I hereby give the following recommendation based on my observations.

1. Student should avoid prioritizing money overwork and experience and should develop a good attitude, good work ethics and be a good ambassador of the university they are representing.

2. Proper orientation should be given to the students by the university before they go on SIWES at least before mid-semester break of first semester.

3. The placement letter should be given to students early enough so as to avoid attachment in irrelevant organization.

CONCLUSION

In conclusion, I have experienced and developed various aspects of site activities during the period of my industrial training. The whole training period was very educative, instructive, and challenging.

I was able to gain new insights and more comprehensive understanding about the real industry working condition and practice. The six months placement also provided me the opportunities to develop and improve my functional skills. All of these valuable experiences and knowledge were not only acquired through the direct involvement in the task given but also through other aspect of the training such as work observation, interaction with workers, colleagues, superior, and participating in online courses related to structural design and construction.

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