TECHNICAL REPORT

ON

STUDENTS' INDUSTRIAL WORK EXPERIENCE

SCHEME (SIWES)

Undertaken at

CYNKEL NIGERIA LIMITED

Written by

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ND/23/CEC/PT/0022

DEPARTMENT OF CIVIL ENGINEERING

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Submitted To:

DEPARTMENT OF CIVIL ENGINEERING INSTITUTE OF TECHNOLOGY, KWARA STATE POLYTECHNIC, P.M.B. 1376 ILORIN

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FORAWARD OF NATIONAL DIPLOMA (ND) CERTIFICATE IN CIVIL ENGINEERING

DEDICATION

This report is dedicated to Almighty Allah, the beginning and the end, the doer of all things, who spare my life before and after the completion of this programme (SIWES). Also to my dearest parent Mr/Mrs Isiaka for their moral and financial support toward my success and also to all my friends in **CYNKEL NIGERIA LIMITED** I pray that you will all reap the fruit of your labour.(Amen).

CERTIFICATION

This is to certify that this report was compiled by **ISIAKA RUQOYYAH** with Matric Number **ND/23/CEC/PT/0022** a student of Civil Engineering Technology Department, Institute of Technology (I.O.T) Kwara State Polytechnic Ilorin, Kwara state on the completion of the Student Industrial Work Experience scheme (SIWES**).**

_____ _____

SIWES CORDINATOR **DATE**

_____ _____

HEAD OF DEPARTMENT **DATE**

ACKNOWLEDGEMENT

My greatest thanks go to Almighty Allah for making this programme (SIWES) of four (4) month a success for me and for spearing my life till date. He is the only God and the greater God. I promised to serve him till life comes to an end by His grace.

My sincere appreciation also goes to my parent Mr/Mrs Isiaka for their support and encouragement, both moral and financially throughout the successful completion of the programmes.

My appreciation also goes to the entire lecturers and staff both teaching and non-teaching staff of Civil Engineering Technology Department for long they have been supporting and guiding us. Thank you all and my Almighty Allah will be with you all (Amen).

And to the entire staff and management of **CYNKEL NIGERIA LIMITED** I thank you all for your support in making my four (4) months stay a worthwhile. I Love you all.

PREFACE

This booklet contains the details of activities and experience undergone during my four (4) months Student Industrial Work Experience Scheme, also known as SIWES which was held at of **CYNKEL NIG LTD at 11, Iseyin Street Palmgrove, Lagos Nigeria.** The experience and knowledge acquired during the programme was written in this report which is basically on construction, which is also essential for the fulfilment of National Certificate. It has exposed me to the use of various tools whose operation techniques work only but theoretically explained in the lecture room. I thank the National Board of Technical Education for the introduction of the Student Industrial Work Experience Scheme (SIWES) programmed to the school of learning.

CHAPTER ONE

I.1. INTRODUCTION

SIWES: Student Industrial Work Experience Scheme is a programme designed by many tertiary institutions to acquaint students with the practical or field knowledge of their profession. It enhances student's knowledge of the past, present and the future. By the past, I mean it affords the student an opportunity to witness practically what has been taught theoretically in the class. And by the present, I mean distinguishing between theoretical knowledge and what is on ground i.e. the reality of the 100% assumption by the theories. It also affords student the current knowledge of what the field is all about, getting familiar with new development in technology. The future aspect of it is the foreknowledge of what should be expected when he/she begins to practice the profession. In partial fulfilment of the award of Bachelor's Degree in engineering in the Faculty of engineering, University of Jos. The SIWES programme is very important. It makes engineering very real, to be precise, civil engineering. Going to the field brings to sight those visualized beams, columns, slabs e.t.c. Furthermore, it avails the students an opportunity to learn inter- and intra- personal relationship, office organization and administration, site management, identification of equipment's among other opportunities. This report entails some of the experience I was able to acquire in my little period of attachment.

1.2 BACKGROUND OF SIWES

The programme (SIWES) came to existence through establishment of the Industrial Training Fund (ITF) under decree 47 of 1971 in bid top boost professionalism in the construction industry. The fund in its policy statement NO.1 published in 1973 inserted a clause dealing with the issue of practical skill. The fund will seek to look out co-operative machinery with industry, where students in institutions of higher learning may rewrite industrial training or mid-career attachment by contribution to the allowance payable to the students. SIWES is therefore a skill training programme designed to expose and prepare students of the universities, polytechnics and colleges of education to practical work on site, this scheme is for students of engineering and technology including environmental, technical and business studies. However, in 1979, ITF withdrew the funding enjoyed by polytechnics and colleges of education, technical and went ahead to notify all universities that it would withdraw the funding of SIWES as from January.

1980. In view of this, the National University Commission took up the responsibility of funding the programme for engineering and technology students of Nigerian Universities, while the National Body for the Technical Education (NBTE) assumed financial responsibilities for the programme in the polytechnics and colleges of education. The administration of the programme was still a Herculean task and was not without a myriad of operational problem so the Federal Government agreed on the funding of the scheme in 1985. In 1985, ITF assured the administration of SIWES programme.

1. 3 BODIES INVOLVED IN THE MANAGEMENT OF SIWES:

The bodies involved are:

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

Other supervising agents are:

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

The functions of the agencies above includes :

- Establish SIWES and accredit SIWES unit in the approved institutions.
- Formulate policies and guidelines for participating bodies and institutions as well as appointing SIWES coordinates and supporting staff.
- Supervise students at their places of attachment and sign their log-book and I. T forms.
- Ensure payment of allowances for students and supervisors.
- Ensure adequate funding of the scheme.

1.4 AIMS AND OBJECTIVES OF SIWES:

The purpose and reason behind the establishment of SIWES by the government are numerous and they are discussed below:

1. To allow students to apply theoretical knowledge they have gathered in the four walls of the university to practical issues where the knowledge is highly needed.
2. To help students on how to interact with people of varying ranks and classes when they finally get employed.
3. To help prepare students for future challenges and innovations in establishments.
4. To allow the students develop exceptional skills and instincts in their individual disciplines by participating actively in the operations of their areas.

1.5 IMPORTANCE OF SIWES TO CIVIL ENGINEERING

1. It exposes students to more practical work methods and techniques in civil engineering.
2. It provides students in civil engineering with an opportunity to apply their theoretical knowledge to real life situations.
3. It enables students in civil engineering to gain experience in handling equipment and machineries.
4. It provides an environment whereby students in civil engineering can develop their creativity and interpersonal skills through software design techniques.
5. It is one of the requirements for the award of Bachelors of Science Degree (B.Sc.) in Civil Engineering

1.6 JUSTIFICATION OF CHOICE OF INDUSTRY

Theoretical knowledge alone would not usually prepare and prepare an educated person for the world of work. The worker or productive individual must not only be knowledgeable but also be versatile in the application of skills to perform defined jobs or work. Both education and training are important; there cannot be effective education without some training input and there cannot be effective training without some educational input. The productive individual, particularly in this millennium, must be able to combine and utilize the outcomes from the two forms of learning

CHAPTER TWO

LITERATURE REVIEW

2.0 DEFENCE RESEARCH AND DEVELOPMENT

The Defence Research Development coordinates and conducts research and development of military science and technology for the purpose of enhancing local sourcing of material in support of military operations. It is headed by the Director General of Defence Research Development

2.1 MISSION: To be a internationally recognized research and development centre capable of meeting Nigeria's defence and security needs while leveraging on expertise of indigenous and international partners.

2.2 VISION: To provide strategic direction for self-reliance in defence and security needs through research and development.

2.3 THE VARIOUS DEPARTMENT IN THE ESTABLISHMENT AND THEIR FUNCTIONS

1. Administrative Department: This department is responsible for providing administrative aid in five areas of a business: information management systems, human resources, payroll, acquisition and communication. The goal of the administration department is to keep all departments within a business operating at maximum capacity.
2. Department of works and services (DWS): DWS departments entails the employment of total quality management concept through planning, coordination, and supervision of every project work. DWS is aimed at meeting a client's requirement in order to produce a functionally and financially viable project

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 MATERIALS

3.1.1 Concrete: Concrete is a composite material composed of fine and coarse aggregate bonded together with a fluid cement (cement paste) that hardens (cures) over time. When aggregate is mixed with dry Portland cement and water, the mixture forms a fluid slurry that is easily poured and moulded into shape.

3.1.2 Cements: Cement is a dry powdery substance made by calcining lime and clay, when mixed with water to form mortar or mixed with sand, gravel and water to make concrete. It is a binder material. Once hardened, cement delivers sufficient strength to structures.

3.1.3 Water :A clear colourless liquid, odourless and tasteless when pure, that occurs as rain, snow and ice, forms rivers, lakes and seas, and is essential for life. Water is one of the most important elements in construction and is required for the preparation of mortar, mixing of cement concrete and for curing work e.t.c. The quality of water used has a direct impact on the strength of the mortar and cement concrete in the construction work.

3.1.4 Aggregate: This consists of sand, ground crushed stone, broken blocks and similar such materials. Aggregate may either be light or heavyweight and also all-in- aggregates. Aggregates must be clean, structural sound, well graded and weather resistance.

There are two types of Aggregates:

• Fine Aggregate (sand) : These are any natural sand particles or any crushed rock (stone dust).

• Coarse Aggregate: These are crush rocks used in the production of concrete, and are of different sizes.

3.1.5 Reinforcement bar: Reinforcement is provided in concrete structures to enhance its tensile strength. Basically reinforcement bars of different sizes were used in reinforcing the columnbase (basket), retaining wall, columns, beams and slabs e.t.c. Therefore in all structural members, the reinforcement is provided in the region of the members that will be subjected to tension. The diameters of reinforcement bars used were Y-8,Y-10,Y-12,Y-16 and Y-20 respectively.

3.1.6 Binding wires: This is a flexible steel which are used to tie reinforcement together.

Binding wire is used for binding reinforcement slabs, metal mesh processing, beams walls, columns and so on. In particular, it is used in concrete construction. Binding wire provides a secure hold reinforcing bars of different diameters.

3.1.7 Nails: a slender metal shaft that is pointed at one end and flattened at the other end and is used for fastening one or more objects to each other. Nails are most commonly used in joining pieces of wood together, but they are also used with plastic, drywall, masonry, and concrete.

3.1.8 Sandcrete blocks: Sandcrete blocks comprise of water, sand and cement. Sandcrete blocks are the building units used in the construction of wall and partitions. Diverse sizes of sandcrete blocks are used to construct free standing walls and building structure with load and non – load bearing units. Sandcrete blocks can either be solid or hollow rectangular types with 450mm x 225mm × 225mm (9inches) and 450mm × 150mm x 225mm (6inches) being the most common sizes respectively.

3.1.9 Timber: large piece of wood, usually squared, used in a building e.g. wooden form-works. These were provided for the construction of form-works to columns, beams, slabs and retaining wall

3.1.10 Caution Tape: This is also known as barricade tape, construction tape or barrier tape. This is used in construction zones to notify people about ongoing construction and that there are possible hazards within the demarcated area. Construction tape usually employs a yellow-black colour combination and incorporates printed text, such as "Under Construction", "Caution", "Work Zone", and "Keep Out" (among others). This type of tape is commonly found at the site of renovations, demolition, and minor repairs.

3.1.11 Bitumen felt: Bituminous or Roofing Felt is a glass fibre or polyester fleece impregnated with bituminous material e.g. tar or bitumen which is produced in roll form and is used as a waterproof material. The bituminous felt was placed on the retaining wall before backfilling to avoid the Penetration of water and it was applied with the use of burner.

3.2 EQUIPMENT

The following are various tools used on site.

3.2.1 Trowel: This is a flat metal blade fixed to a short handle used for the application, jointing, smoothing, and shaping of mortar in masonry. It is also used in trimming of block/bricks. Trowel size range from 225-350mm measuring from the blade.

3.2.2 Spirit level: This is a Hand-tools used for indicating true horizontal and vertical of a work, by means of air bubbles sealed in a marked, liquid-filled glass tube mounted in a frame; the tube is horizontal when the bubble is between two marks. Spirit level are of various length ranging from about 250mm - 1.2 mm.

3.2.3 Builder's square: this is a hand tool of a angle 90 which measures 600mm by 450mm long. It is used for setting - out walls at right angel triangle to check for square nature of a section of work.

3.3 MACHINERIES USED

The machineries that were used on site were brought into consideration so as to promote high standard requirement. Machineries are used on site to eliminate heavy manual work. Such machineries that were used include the following;

3.3.1 Excavator: Excavator is a earthmoving machine that feature a bucket, arm, rotating cab, and movable tracks. These components provide superior digging power and mobility, allowing this heavy equipment to perform a variety of functions, from digging trenches and breaking holes to lifting away waste and excavating mines.

3.3.2 Concrete mixer: A concrete mixer (often mistakenly called a cement mixer) is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components.

3.3.3 Front end loader: A loader is a heavy equipment machine used in construction to move or load materials such as soil, rock, sand, demolition debris, e.t.c.

3.3.4 Poker vibrator: This consist of a hollow steel tube causing in which is a rotating impeller which generates vibrations as its head comes into contact with the casting. It is immersed in fresh concrete to provide compaction through gentle agitation.

3.4 STRUCTURAL MEMBER

These are members that forms the skeleton system that supports the structure.

3.4.1 Foundation: A foundation is the substructure on which the whole building rests on. Foundations are generally considered either shallow or deep and are selected prior to the structural property of the soil.

Pad foundation: Pad foundations are common for storey buildings which are situated on relatively good soil. The function of the pad is to spread out the point load coming from the building over an area large enough to make the applied pressure lower than the soil's load bearing capacity. As a result, the size of the pad or base depends on the bearing capacity of the soil. For good soils, the pads are always relatively small compared to those in low-bearing soils.

Plate 3.0: Showing Pad footings reinforcement works.

3.4.2 Beams: A beam is a structural element that is capable of withstanding load primarily by resisting bending. The bending force induced into the material of the beam as a result of the external loads, own weight, span and external reactions to these loads is called a bending moment. Beams are characterized by their profile (shape of cross-section), their length, and their material. Also a beam is a horizontal member of a building which receives load from the slab and the transmitting them to the column and to the foundation. Generally, beams not exceeding 6.0m are designed for a depth of 450mm while between 6.0m and 7.0m has a depth of 600mm i.e. the longer the span of the beam the larger the depth of the beam.

3.4.3 Columns: The column is the structural member that receives load from the beams and transfers it down to the foundation. The columns are usually compression members, but are also subjected to bending along their axes. The primary function of a column or wall is to act as a vertical support to suspended members and to transmit loads from these members to the foundation below. Hence, its strength lies in the capacity of the resist compressive stress.

Plate 3.1: Showing Columns of different sizes.

3.4.4 Staircase: For a building with a suspended floor, or more, the means of moving between floors are the stairs. A staircase is a set of steps or flight leading from one floor to another. Stairs could be constructed by timbers, stone/concrete (reinforced).

The following are the components of typical stairs:

- The riser
- The tread
- The concrete waist
- The landing

The riser is the vertical side of a step, while the tread or going is its horizontal side. The concrete waist is the inclined reinforced concrete slab on which the riser and tread sit.

3.4.5 Slabs: Slabs are constructed to provide flat surfaces, usually horizontal in building floors, roofs, bridges, and other types of structures. in most cases slabs are horizontal members but they can be used as vertical members such as walls to infill panels, side walls to drains and sewer e.t.c. The slab may be supported by walls or by reinforced concrete beams usually cast monolithically with the slab or by structural steel beams or by columns, or by the ground.

Plate 3.2: Showing Casting of slabs

3.4.6 Retaining wall: a retaining wall is a structure designed and constructed to resist lateral pressure of soil when there is a desired change in ground elevation that exceed the angle of repose of the soil. A basement wall is thus one kind of retaining wall, but the term usually refers to a cantilever retaining wall, which is a free-standing structure without lateral support at its top. These are cantilevered from a footing and rise above the grade on one side to retain a higher level grade on the opposite side. The wall must resist the lateral pressure generated by loose soils or in some cases water pressure.

3.5 NON-STRUCTURAL MEMBER

Non-structural member refer to everything in or on a structure other than the structural member. Unlike structural elements, if non-structural elements fail, the structure will not collapse.

3.5.1 Expansion joint: In structure, an expansion joint is a mid-structure separation designed to relieve stress on building materials caused by building movement. this is usually provided in structures spanning over 10m and above, the material used in construction of expansion joints is called a Polystyrene board, they are provided between two structural elements to ensure proper separation between the two elements.

3.6 METHODS AND TESTS

3.6.1 Slump test: This is the most common, easy and simple test used to measure the workability of fresh concrete. It is carried out to check the workability or consistency of freshly mixed concrete in a specific batch. This test was done at construction site before the concreting process. The use of a metal mould in the shape of a conical frustum know as a slump cone that has an opening at both ends and has attached handles, the cone has an internal diameter of 100mm (3.9 inches) at the top and of 200mm (7.9inches) at the bottom with a height of 300mm (12inches), a tamping rod (600mm), non-porous base plate, and a measuring tape. The slump test was prepared according to BS EN 12350-2 (2009) with the specification ranging from 50mm100mm.

Procedures of slump test are as follows:

- The inner surface of the empty mould is cleaned and oil was applied.
- The mould is set on a horizontal non-porous and non-absorbent base plate.
- The mould is filled by pouring freshly mixed concrete into three equal layers.
- Each layers is tamp 25 times each with a tamping rod over the cross-section.
- After tamping 25 times the top of the layer was struck off level and the mould is lifted slowly in the vertical direction without disturbing the concrete cone.
- A measuring tape is use to measure the different level between the height of the mould and the concrete sample.
- The subsidence of the concrete can either be true, shear, or collapse slump and it is measured in millimetre (mm).

Plate 3.3: Slump test being carried out

3.6.2 Cube test: Test applied to the concrete, this is the utmost important which gives an idea about all the characteristics of concrete. By this single test one judge that whether concreting has been done properly or not. Compressive strength is the ability of material or structure to carry the maximum loads on its surface without any crack or deflection. Under compression test a material tends to reduce the size, while in tension, size elongates. The formula for compressive strength is:

Compressive Strength = Load / Cross-sectional Area

For cube test two types of specimens either 15cm X 15cm X 15cm or 10cm X 10cm X 10cm depending upon the size of aggregate are used. For most of the works cubical moulds of size 15cm X 15cm X 15cm are commonly used. Three cubes are taken from each sample of concrete.

This concrete is poured on the mould and tempered properly so as not to have any voids. After

24hours, these moulds are removed and test specimens are put in water for curing. The top Surface of these specimen should be made even and smooth. This is done by putting cement paste and spreading smoothly on whole area of specimen. These specimens are tested by compression testing machine after 7days curing and 28days curing

Procedure for concrete cube test are:

- The specimens was removed from the water after 7days and 28days curing, excess water wiped out from the surface.

- After the specimen was removed from water and excess water wiped out from the surface, it was weigh using a weighing balance machine and recorded.
- Bearing surface of the testing machine was cleaned and specimen placed in the machine in such a manner that the load will be applied to the opposite sides of the cube cast.
- With the specimen aligned centrally on the base plate of the machine, the movable portion was rotated gently by hand so that it touches the top surface of the specimen.
- Load was applied gradually without shock and continuously till the specimen failed. Maximum load applied was recorded.

This same process was repeated for the other cast cubes (specimen) and their corresponding loads recorded.

Plate 3.4: Concrete Cube mould.

3.7 QUALITY CONTROL OF CONCRETE

3.7.1 Batching of materials: The method of estimating or measuring of the various materials used in concrete mix is known as batch. Before making a concrete mixture, the concrete material must be properly and accurately batched to achieve the excellent quality of the concrete. While on site the method used for batching was volume, volume involves the use of head pans and buckets where used to measure fine aggregate and coarse aggregate. The mix ratio was 1:2:4 that is the ratio of cement to fine aggregate and coarse aggregate and water in the required proportion.

3.7.2 Concrete mix ratio. : Concrete mix ratios are the proportions of concrete components such as cement, sand, aggregates and water. These mix ratios are decided based on type of construction and mix designs. Mixing water with the cement, fine aggregate and coarse
aggregate will form a paste that will bind the materials together until the mix hardens. The strength properties of the concrete are inversely proportional to the water cement ratio. Basically that means the more water used to mix the concrete, the weaker the concrete mix. The grade of concrete used was M25.

3.7.3 Check for concrete cover to reinforcements: Concrete cover, in reinforced concrete, is the least distance between the surface of embedded reinforcement and the outer surface of the concrete. Concrete cover protects the reinforcement from corrosion, insulates the steel from extreme heat such as fire, and it ensures the reinforcement can be actively engaged without slipping when loaded. The sizes of concrete covers vary prior to the elements in which it is provided for, they are checked and provided in to reinforcement before casting or placement of concrete takes place.

3.7.4 Transportation: This involves the means of conveying materials, concrete from one place to the other on site. In the case of concrete, concrete where conveyed from the point of mixing to the point of placement. The choice of transportation depends on the size and complexity of the site, weather condition and the height of the placement of the concrete. The mode of transportation used was the manual method with the use of head pans and labours. A Manson's ladder was made of timber that was constructed to enhance vertical/inclined movements.

3.7.5 Concreting: This so generally referred to as casting. It is process of working with freshly mixed concrete especially the placing of concrete.

3.7.6 Compacting: The compacting of freshly placed concrete is to make is a unit mass by eliminating voids within it. The method and the type of compacting given to concrete depends on the nature of work. Compacting of a concrete can either be done by the use of a wooden stick or a poker vibrator. The use of both methods were used for compacting of concrete.

3.7.7 Curing: After the placing and compacting of the concrete it is allowed to sufficiently harden for a day than the curing process comes in which involves the prevention of the evaporation of moisture in the concrete. The concrete was watered for days with the use of a hose pipe connected to a bore

hole. This was done to avoid shrinkage of the concrete and cause a more permanent and durable material produced.

3.8 CONSTRUCTION ACTIVITIES

3.8.1 Site Clearance: The very first step is site clearance which involves removal of grass and vegetation along with any other objections which might be there in the site, site clearance can either be done manually or mechanically.

3.8.2 Setting-out: The process of laying down the excavation line and centre line on the ground based on the foundation plan is known as setting-out. Before commencing the excavation process, once the design of the foundation is completed, a setting out plan or foundation layout is prepared for a suitable scale and the plan is dimensioned according.

Procedures in setting out of a foundation are:

- The initial step is to mark the corners of the building. After which the lengths of the side are checked by diagonal measurement.
- The centre lines of the trenches are marked with the help of profile, nails, lines and pegs.
- The trenches positioning is controlled by outline profile boards. Profiles are set 2m away from the outline so that they do not interrupt the excavation process.
- The cross walls positioning is performed by measuring along the main walls and squared.

3.8.3 Excavation: Excavation work generally means work involving the removal of soil or rock from a site to form an open face, hole or cavity, using tools, machinery or explosives. Excavation was carried out both manually as well as mechanically.

Plate 3.5: Excavating of the column base(footings) and foundation strips.

3.8.4 Blinding: These was actually done before the placement of the footing baskets, usually 2inches(50mm) of weak concrete was poured into the column-base, which was the thickness or depth. Mostly concrete is used, this is just the mixture of cement, fine aggregate and coarse aggregate and water in the required proportion. Blinding prevents the base reinforcements not to come in contact with the ground surface. There is a tendency that when the reinforcement bars come in contact with the ground surface it easily weaken the reinforcement due to capillary action. The concrete was well tampered using a wooden range and a plumb was also used to check if the surface is levelled.

Plate 3.6: Blinding of the column-base(footing).

3.8.5 Levelling: Levelling is a process of determining the height of one level relative to another. These has to deal with the transfer of horizontal height or horizontal line of sight. These was done by the use of a levelling instrument which is called **DUMPY LEVEL** and a **LEVELLING STAFF** and a **TRIPOD STAND**. Mostly used in determining heights of columns, ground beams, retaining wall before casting takes place and also cut and back filling of lateral.

3.8.6 Form-work: This is a temporary or permanent mould erected to contain concrete during placing and initial hardening it is used to give temporary support for in-situ concrete while it hardens. The inside of a form-work are thoroughly clean and a release agent (lubricant) was placed on the surface of the form-work before fixing. Before the fixing of the form-work, concrete biscuit are tied to multiple places of the reinforcement bars so that the reinforcement can flush uniformly to create a concrete cover after casting. Materials used for form-work are marine board and steel panels.

Plate 3.7: Form-work for the slab and beam.

3.8.7 Block-work: This is the process of laying concrete masonry units to form either external walls as in-fills or lock wall which are load-bearing or non- load bearing or internal walls as partitions. These masonry units are commonly hollow sand-crete blocks which are much economical per unit of wall area. The standard sand-crete block wall is explained below;

Sequence of laying of sand-crete block wall:

•A bed of mortar is spread on the footing/floor.

•The first course of blocks for a lead is laid on the mortar. The mortar for the head joint is applied to the end of each block with the trowel before the block is laid.

•The lead is built higher. Mortar is normally applied only to the face shells of the block and not to the webs.

•A line is stretched between the lead*s on line blocks.

•The course between the leads are laid rapidly by aligning each block with the stretched line.

•The last block to be installed in each course of infill blocks, the closer must be inserted between blocks that have already been laid then the block is lowered carefully into position.

3.8.8 Lintel: This is a structural element usually horizontal that spans the space or opening between two vertical supports. It is used to support and transmit the load above the opening to the

sides. Lintels are usually placed above doors and windows openings. On site in-situ lintels were used. A marine board is used for the form-work and was casted on site. The lintel generally ends into the masonry wall so as to convey the weight carried by them to the masonry walls and its width is same to the wall width. It can also be used as decorative architecture element.

3.8.9 Backfilling: Backfilling is the process of reusing or replacing the soil that is removed during the excavation of foundations or other groundworks to support and strengthen a structure. It protects foundations and forms part of the substructure of slabs, roadways, walkways and other groundwork elements.

Backfilling of the basement using a front end loader.

Lapping of Reinforcement bars: This is the overlapping of two bars side by side to up to the design length. Usually, the stock length of steel bars is limited to 12m. This is for easy transportation of steel bars to the construction site. This amount of overlapping between two bars is called "lap length". Lapping is usually done where minimum bending stress is encountered. In general, lap length is 50d which means 50 times the bar diameter, if both bars are of same diameter.

Cranking of reinforcements: This is mostly carried out in order to ensure that column reinforcements or reinforcements bars that are out of position are being brought back to position to ensure adequate concrete cover.

Scaffold: A Scaffold is a temporary framework used to support people and material in the construction or repair of buildings and other large structures. It is usually a modular system of metal pipes, although it can be made out of other materials. The purpose of a working scaffold is to provide a safe place of work with safe access suitable for the work being done. All scaffolds must be equipped with a toe board to eliminate the possibility that tools or debris will be kicked or pushed onto people below. A scaffold must be designed to support four times the weight of the workers and the materials resting on it.

Plastering : This is the application of a building material called plaster on a wall for protection and decoration. Plasterer is referred to as the type of aggregate when mixed with cement and water is used to spread over coarse textured walls and ceiling surface to provide a smooth level finish plaster basically is a mixture of cement and very fine aggregate (soft sand).

Rendering : This is a term used for plastering done on the external or outer part of the building. It mix ratio is slightly differs from plastering due to its functional requirement. Although mix ratio 1:3 can be used, most times mix ratio 1:4 (i.e 1 part cement and 4 part sand) are used for more strength. Rendering serves as a protection from weather condition.

CHAPTER FOUR

4.0 EXPERIENCE GAIN

4.1SPECIFIC INVOLVEMENT AT THE COMPANY

1. I gained experience on preliminary work on site

2. I gained experience on how to clear site

3. I gained experience on how to mix concrete

4. I gained experience how to identify sizes of reinforcement

5. I was taught on how identify types of foundation

6. I gained experience on different types of tools in building construction

7. I gained experience on how to place concrete

8. I gained experience on how to do strip foundation

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5. 1 SUMMARY

The industrial training enlightened me on practical and field aspects of engineering. During the training, I also came across people from different tribes and different parts of the world thereby improving my human relations.

5. 2 CONCLUSION

The industrial training over years has been found to be effective and efficient in closing the gap between the scientific study and practical study. The Student Industrial Work Experience Scheme (SIWES) has exposed me to practical works but also has opened me up in the way to interact with senior colleagues in the field, which has exposed me to industry based skills necessary for a smooth transition from the classroom to real-time practice of the profession.

training has exposed me to the following important spheres of development:

1. How to deal and interact with other fellow engineers in the field of civil engineering.
2. Finding that team work is the most important element in every successful project.
3. Learn that the civil engineer is capable of a lot of work such as supervision, implementation, the calculation of quantities and design of structures. Also, an engineer can work as a consultant or contractor.
4. How to control and manage the site and how to behave when there is a problem by taking a professional decision.
5. Plan must be clear and easy to read for those who will use it.

5. 3 RECOMMENDATIONS

In view of the relevance of the SIWES program, it is important that it is sustained by the government through the Industrial Training Fund (ITF) as it exposes the student to work tools, facilities, and equipment that may not be available in their respective institutions in relation to their course of study. To this end, I recommend that the following under-listed points should be implemented:

i. Students' Industrial Works Experience Scheme (SIWES) needs to be strengthened by all concerned stakeholder in order for its objectives to be fully realized.

iii. Regular monthly allowances for students on attachment should be paid promptly.

iv. Experience staff should always be made to train the students on attachment

v. There should be more funding of the scheme by the government in order for it to be more effective.

5.4 CHALLENGES ENCOUNTERED DURING MY SIWES

1. The industrial training fund (ITF) delay of payment to SIWES students reduce the level of seriousness which students put into the scheme.

2. Many students were not given remuneration or allowance. Prior to that, some were faced with difficulty in getting placements.

3. During my first few weeks, I had difficulties understanding a lot of the terms and terminologies that was used at the office because a lot of them were very new to me. This made it hard for me