TECHNICAL REPORT

ON

STUDENTS' INDUSTRIAL WORK EXPERIENCE

SCHEME (SIWES)

Undertaken at

MAINSTREAM FOUNDATION (ANDRITZ) JEBBA LIFE CAMP

Written by

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ND/23/CEC/PT/0074

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Submitted To:

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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 Abdullahi for their moral and financial support toward my success and also to all my friends in mainstream foundation (andritz) jebba life camp**,** I pray that you will all reap the fruit of your labour.(Amen).

CERTIFICATION

This is to certify that this report was compiled by **Abdullahi Toheeb** with Matric Number **ND/23/CEC/PT/0074** 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 Abdullahi 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 **MAINSTREAM FOUNDATION (ANDRITZ) JEBBA LIFE CAMP** 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 **MAINSTREAM FOUNDATION (ANDRITZ) JEBBA LIFE CAMP** 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.

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CHAPTER ONE

1.0INTRODUCTION

1.1INTRODUCTION TO SIWES IN NIGERIA

Student Industrial Work Experience Scheme (SIWES) is said to be an integral part of some degree and diploma programme in institution of higher learning in Nigeria, aimed to expose and prepare student for the industrial work situation they are likely to meet after graduation.

The scheme also affords the students an opportunity to familiarize and expose themselves the needed experience in handling equipment and machinery that are not available in their institutions. Before the establishment of the scheme, it was of great concerns to the industrialists that graduate of higher institution lacked adequate practical background studies preparatory for employment industries. The programme was introduced in year 1973/1974 to acquaint the students with the skills of handling employer's equipment and machinery. The Industrial Training Fund (ITF) has accepted to bridge the gap between theory and practice. The SIWES programme was effectively taken over by the ITF in 1985 with the fund being body solely bone by the government to provide adequate funds to the industrial training.

1.2AIM AND OBJECTIVES OF SIWES

1. To broaden the knowledge of student.
2. To prepare students for the industrial work, they are to meet after graduation.
3. To help student at work method and techniques in handling equipment and machinery.
4. To prepare students by applying their knowledge to real work situation and thereby bridging the gap between theory and practice.
5. To provide an avenue for the students in hog her institution to acquire industrial skills and experience relating to their course of study.

CHAPTER TWO

2.0 **Site Clearance**

The very first step 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.

2.1 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 plane or foundation layout is prepared for a suitable scale and the plan is dimensioned according.

Procedure in setting out of a foundation are:

- The Initial step is to mark the corners for the building. After which the length of the side are checked by diagonal measurement.
- The centre line 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.

2.2 EQUIPMENT USED IN SETING OUT

SITE PLAN: This show the relationship of the building to the site boundaries. roads, and building.

STEEL SQUARE: It is made of iron or metal to set right angle i.e triangulation.

HAMMER: This is use to drive the peg and the nail.

TAPE RULE: This is used in measuring the distance and also used in setting out right angle triangle by Pythagoras theorem 3:4:5.

BUILDING LINE: These line usually distance that must be maintained during the proposed building and the site boundary.

PEG: This is use for marking out and fixing lines.

LEVELLING STAFF: Staff is used for ordinary leveling work, it is sectional and are used for taking measurement in the vertical direction.

2.3 STEP IN SETTING OUT

The first thing we need to establish is a parallel lines, we will assume for the sake of this article that we have an existing building close to the proposed new structure. These lines should be offset from the building to prevent any possible snagging of the string lines; in this case i have off set the lines 500mm.This line should then be established with the use of a stake at each end and the line should be fixed at each point. Pleasure ensure the line is very tight as this will prevent a false reading if the weather conditions are very wind.

STEP 1: We have the parallel lines established we can refer to the drawing to find the distance required from these lines to comply with your planning permission and we can put in our first pin as point A

STEP 2: We can measure out along our parallel line using the off set of 500mm to establish position B and we can put in another pin.

STEP 3: A little more work to establish point C. For this we will need our 2tapes, you will need to work out the diagonal measurement from point A to point B this would be done using **the Pythagorean Theorem. Once** you have this measurement established you can extend your tape from position A to position **B** until you reach the measurement, then extend your other tape from position B until the 2 tapes exactly cross at the required measurements, this will establish position C and a pin should be driven into the ground.

STEP 4: We have to repeat the process of stage 3. Using the diagonal measurement you have established take your tapes and run them out from position Band C until they exactly cross on your tapes at the established measurements and drive a pin in at position D. Now we have a box which is bigger than an actual building to allow for a concrete toe which is explained in the picture below.

STEP 5: Now we have 4 pins in the ground establishing the outside of our dig, you should get these lines very close to the ground without being snagged and either run a line of sand on the lines or use a ground spray paint.

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

2.5 FOUNDATION

A foundation may describe as that part of a structure which is in direct contact with the ground to which the weight of the structure and other loads on the structure are transmitted.

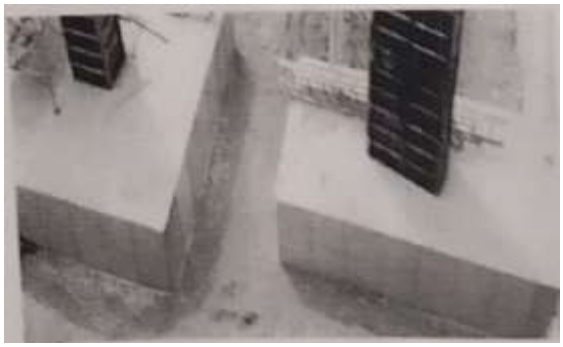
TYPE OF FOUNDATION

1. Strip foundation
2. Pad foundation
3. Raft foundation
4. Pile foundation

1. **Strip foundation**: This is indicating as columns bed of concrete about thickness of 225mm.it is a concrete structure, which runs along the entire perimeter of the house. These foundations of construction under all load-bearing walls, maintaining the same basic cross-sectional area

STRIP FOUNDATION

2. **Pad foundation**: These are isolated foundation usually of reinforced concrete. They support concrete, steel columns, piers or pillar in frame building. They are generally shallow foundations, but can be deep depending on the ground conditions.

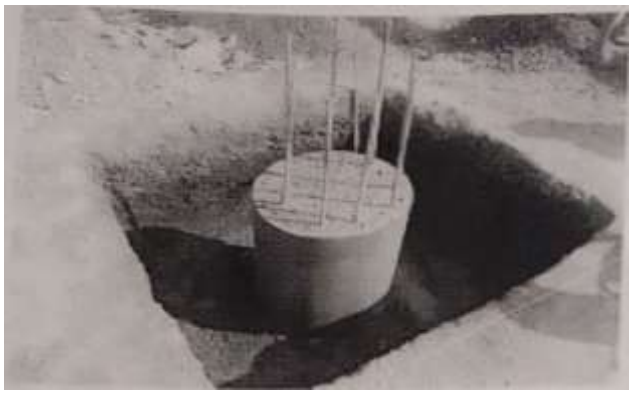


PAD FOUNDATION

3. **Raft foundation:** Is the one of concrete that is suitably reinforced and up to 300mm thick which covering the entire area of the building and may extend beyond it. Sometimes area covered by raft may be greater than the contact area depending on the bearing capacity.

RAFT FOUNDATION

4. **Pile foundation:** It is apply and used when the building are construct on clayey or soft soil. The piles enable the builder to have the weight of the building carried by ground and below the poor top soil. They are principally used to transfer the loads from a superstructure, through weak, compressible strata or water onto stronger, more compact, less compressible and stiffer soil or rock at depth, increasing the effective size of a foundation and resisting horizontal loads.



PILE FOUNDATION

PURPOSE OF FOUNDATION

- To sustain the deadload of the building as well as all other loads super imposed on it.
- To transmit these loads to the sub-soil and distribute them over an area of bearing surface to ensure even settlement of the structure.

- To protect the surface from drainage due to movement of the soil which is caused by shrinkage or swelling.

Concrete mix

Concrete mix are the proportion of concrete components such as cement, sand, aggregate water. These mix ratios and decision based on types of construction and mix designs. Mixing water with the cement, fine aggregate and coarse aggregate will form a paste that will bind the material together until the mix hardens. The strength properties of the concrete are inversely proportional to the water cement. Basically that means the more water used to mix the concrete, the weaker the concrete mix. The grade of concrete used was m25.

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.

Showing Casting of slabs

Types of Wall

The types of block used for wall construction are:

225×225×450 =for erecting external walls

150×225×450 =for erecting external wall and partition

100×225×450 =for erecting petition walls only

102.5×215×60brick =for erecting external and petition walls

Other decorative blocks are required for fancy work only

The most important aspect of block laying are:

- Lining = straightness of wall
- Level = through horizontal surface
- Plumbing =through vertical surface

Material needed for reinforcement concrete

Reinforcement bar: Reinforcement is provided in concrete structures to enhance its tensile strength. Basically reinforcement bars of different sizes were used in reinforcing the column base (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.

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.

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. **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.

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

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.

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.

Construction drainage

Drainage is a critical aspect of construction, as it helps to prevent water accumulation and damage to buildings and surrounding areas. A well-designed drainage system is essential to ensure the structural integrity and safety of a building. In this write-up, we will discuss the importance of drainage in construction, types of drainage systems, and best practices for constructing a reliable drainage system.

Importance of Drainage in Construction

Drainage plays a vital role in construction, as it helps to:

1. **Prevent Water Accumulation**: Drainage systems help to prevent water accumulation around buildings, which can cause structural damage and erosion.
2. **Reduce Risk of Flooding**: A well-designed drainage system can help to reduce the risk of flooding, which can cause damage to buildings and surrounding areas.
3. **Prevent Soil Erosion:** Drainage systems help to prevent soil erosion, which can cause instability and damage to buildings.

Types of Drainage Systems

There are several types of drainage systems used in construction, including:

1. **Surface Drainage**: Surface drainage systems involve the use of gutters, downspouts, and catch basins to collect and dispose of rainwater.
2. **Subsurface Drainage**: Subsurface drainage systems involve the use of pipes and drains to collect and dispose of water that accumulates beneath the ground surface.
3. **Combined Drainage**: Combined drainage systems involve the use of both surface and subsurface drainage systems.

Best Practices for Constructing a Reliable Drainage System

To construct a reliable drainage system, follow these best practices:

1. Conduct Site Analysis: Conduct a site analysis to determine the slope and drainage patterns of the land.

2. Design a Comprehensive Drainage Plan: Design a comprehensive drainage plan that takes into account the site analysis and local building codes.
3. Use High-Quality Materials: Use high-quality materials, such as PVC pipes and fittings, to construct the drainage system.
4. Install Drains and Pipes Correctly: Install drains and pipes correctly, ensuring that they are sloped and aligned properly.

Tiles

Tiles are flat, thin pieces of material used to cover surfaces such as floors, walls, and countertops. They are typically made from ceramic, porcelain, natural stone, or glass.

Types of Tiles

1. **Ceramic Tiles**: Made from clay and other minerals, ceramic tiles are durable and resistant to moisture.
2. **Porcelain Tiles**: A type of ceramic tile, porcelain tiles are known for their whiteness and durability.
3. **Natural Stone Tiles**: Made from natural stone such as marble, granite, and slate, these tiles are durable and aesthetically pleasing.
4. **Glass Tiles**: Made from glass, these tiles are translucent and often used for decorative purposes.

Uses of Tiles

1. **Flooring:** Tiles are commonly used for flooring due to their durability and ease of maintenance.
2. **Wall Covering**: Tiles can be used to cover walls, providing a decorative and easy-to-clean surface.
3. **Countertops**: Tiles can be used for countertops, providing a durable and heat-resistant surface.

Benefits of Tiles

1. Durability: Tiles are durable and can withstand heavy foot traffic and spills.
2. Easy Maintenance: Tiles are easy to clean and maintain, making them a popular choice for busy households.
3. Aesthetics: Tiles come in a wide range of colors, patterns, and textures, making them a versatile decorative option.

Uses of Crane forklife:

Cranes and forklifts are essential equipment in various industries, including construction, manufacturing, logistics, and warehousing. Here are some of the common uses of cranes and forklifts:

Uses of Cranes

1. Heavy Lifting: Cranes are designed to lift and move heavy loads, such as construction materials, equipment, and machinery.
2. Construction: Cranes are used in construction sites to lift and place building materials, such as steel beams, concrete blocks, and roofing materials.
3. Industrial maintenance: Cranes are used in industrial settings to lift and move heavy equipment, such as generators, pumps, and machinery.
4. Shipbuilding and Repair: Cranes are used in shipyards to lift and move heavy ship components, such as engines, propellers, and anchors.
5. Disaster Response: Cranes are used in disaster response situations to lift and move debris, and to assist in search and rescue operations.

Uses of Forklifts

1. Material Handling: Forklifts are used to lift and move materials, such as pallets, crates, and boxes, in warehouses, manufacturing facilities, and distribution centers.
2. Inventory Management: Forklifts are used to manage inventory, including receiving, storing, and shipping goods.
3. Loading and Unloading: Forklifts are used to load and unload goods from trucks, trailers, and shipping containers.
4. Warehouse Organization: Forklifts are used to organize and maintain warehouse spaces, including stacking and storing materials.
5. Construction Sites: Forklifts are used in construction sites to lift and move materials, such as lumber, pipes, and equipment.

Benefits of Using Cranes and Forklifts

1. Increased Efficiency: Cranes and forklifts can significantly increase efficiency and productivity in various industries.
2. **Improved Ssafety:** Cranes and forklifts can help reduce the risk of injury and accidents by minimizing manual handling and lifting.

3. Cost Savings: Cranes and forklifts can help reduce labor costs and minimize damage to materials and equipment.
4. **Enhanced Accuracy:** Cranes and forklifts can provide precise control and accuracy when lifting and moving heavy loads or materials

SCAFFOLD

Scaffolding refers to a temporary structure that is built to support workers , materials and tools while they work at height on building, bridges, or other large structures. Bridges or other large structure. The main purpose of scaffolding is to provide safe access to area that are difficult to reach and to support the weight Can have a few different meaning depending on the context:

Construction: In building and construction, a scaffold is a temporary structure used to support workers and materials during the construction or repair of buildings and other large structures. It's often made or metal or wood and allows workers to safety reach high areas.

Braces: Diagonal supports that stabilize the scaffold and prevent movement or collapse

Figurative: It can also be metaphorically to describe a basic framework or support system for something like a plan or idea, which helps develop or build it up

Types of scaffolds

1. **Supported Scaffolds**: these are the most common type of scaffolds consisting of a platform supported by vertical poles, such as frame scaffolds
2. **Rolling scaffolds**: These are mobile scaffolds with wheels, allowing workers to move the platform easily from one area to another.

Safety consideration

Stability: proper bracing and anchoring are essential to ensure the scaffold doesn't tip over

Inspection: scaffolds should be inspected regularly to check for any damage or instability.

Load-bearing capacity: scaffolds must to be designed to carry the weight of workers tools and materials

CHAPTER THREE

3.0 WORKDONE

3.1 BUILDING DESIGN

Building design is refers to as the broadly based architectural. Engineering and technical application to the design of building, all building project require the services of a building designer, typically a licensed architect or structural engineer. Smaller, less complicated project often do not require a licensed professional, and the design of such project is often undertaken by building designers, chaftpersons, interior designers (for interior fit-out or renovation) or contractors. Larger, more complex building requires the service of many professionals trained in specialist discipline, usually coordinate by the architect

3.2 BUILDING CONSTRUCTION.

Building system construction starts with planning, design and financing and continue until the structure is ready for occupancy.

Building construction: this is the process of adding structure to real property or construction of building. The vast majority of building construction job are small renovations, such as addition of room of renovation of a bathroom.

BUILDING CONSTRUCTION OPERATIONAL SAFETY:

Construction can be particularly hazardous. Personal protective equipment, fire safety, electricity safety, and other precaution are essential for safe construction work. Those are the guideline to follow when visiting or working at construction sites:

- Do not walk, stand, or work under suspended load, be sure to crib, block, or otherwise secure the load as soon as possible.
- Avoid placing unusual strain on equipment or materials.
- Be prepared for unexpected hazards.

BUILDING CONSTRUCTION PROCESS

This involves the following:

1. Excavation
2. Foundation
3. Flooring
4. Block work

5. Casting
6. Roofing
7. Plastering
8. Painting

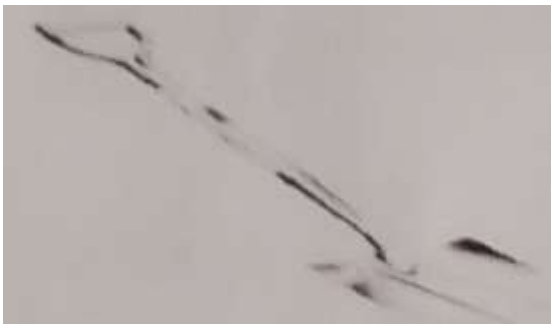
3.3 MACHINERY AND TOOLS

Is major issue which grants work done to optimum satisfaction? Those machinery and tools are used to access work of site for construction. Each with different function. For example digging is carried out in two methods:

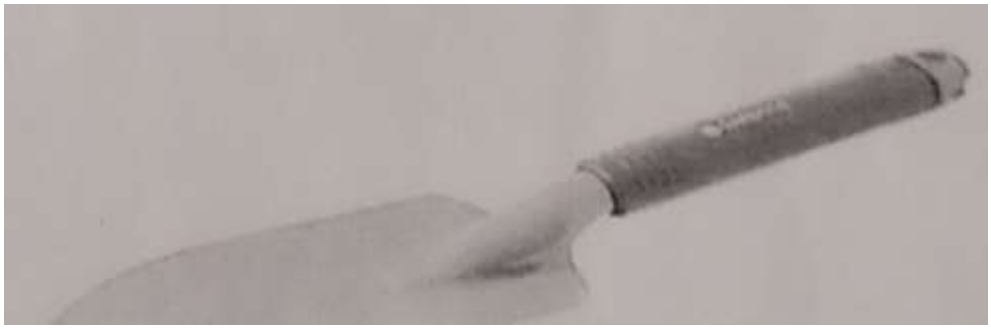
a. Mechanically e.g, excavator
b. Manual e.g. digger

EXAMPLE OF TOOLS AND MACHINE USED IN BUILDING CONSTRUCTION

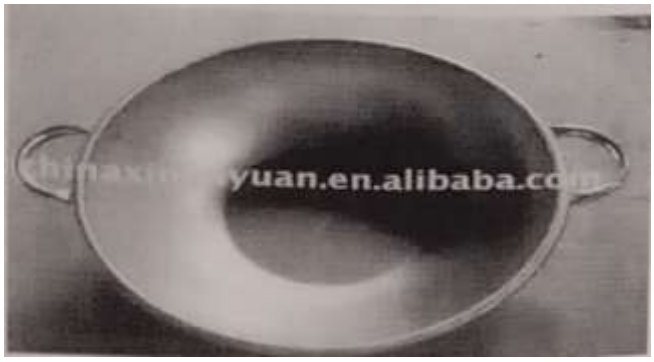
SHOVEL



HAND TROWEL



HEAD PAN



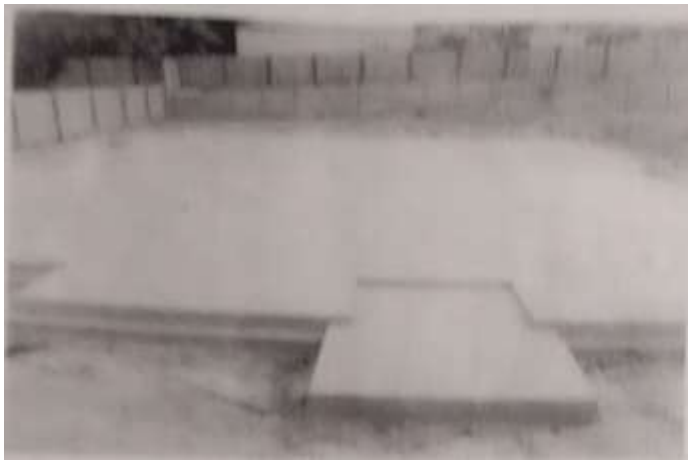
SPIRIT LEVEL

BULDOZER

- Loader
- Mixer
- Plumb bob
- Chisel
- Trowel
- Measuring tape
- Carpentry pencils
- Angle
- Vocal vibrator
- Rammer
- Straight edge
- Line

3.5 FLOOR SLAB

Concrete slab floor comes in many forms and can be used to provide great thermal comfort and lifestyle.



STEPS INVOLVED IN CASTING CONCRETE FLOOR SLAB

Whether casting concrete for foundation footings to support a simple timber structure, or for a solid slab that will form the floor of a garden building to be built from wood, the principle are exactly the same.

- Build the foundation walls on concrete and allow the molter to set, fill with hard core and sand, moisten and compact with a punner or roaming tool, leaving about 75mm of block wall above the fill.
- Spread polythene over the hardcore, overlapping all joints by 100mm.this damp proof membrane form a moisture barrier and is an essential measure to take against rising damp.

- Working in batches, mix sufficiently cement with sand and 19mm stones in the ratio of 1:2:3 and enough water to make it workable, pure the mix over the plastic up to top of the block wall to form the slab.

Use straight edge length of wood to compact and level the concrete.so that it meet the top of the foundation wall.

3.6 BLOCK WORK

Brick and blocks are component of durable massory construction in which uniform shape individual unit are laid in courses with mortar as the bed and bidding material they consist of high mass material with good compressive strength formed into unit that can be lifted and handle by a single worker.

- The mixture ratio should be 1:6(1 cement, 6 fine aggregate) for a wall of 9inches.
- The cement, sand and water mixture should minimum within two hours.
- The joint between the blocks should not be one above the others.
- At the end of the day, the length of the wall should end at an angle of 45°. **PROCEDURE FOR SETTING BLOCK WALL FOR SUPER STRUCTURE**

After laying the foundation concrete, wall construction commences according to the setting out plans. The common tools required for wall construction include:

1. Trowel
2. Tape
3. Spirit level

4. Straight edge
5. Line
6. Head pan
7. Batten
8. Shovels

3.7 PLASTERING

Plastering is the work used for covering rough surface of building component such as: walls and ceilings with a coat of plaster to form a smooth and durable surface, it is carried out for beauty, durability and resisting rain penetration.

PLASTERING METHOD

PREPARATION OF SURFACE: all the joint of the block work should have been raked out properly during block work construction itself. Dust, loose mortar etc. must be thoroughly washed with water, clean and kept wet before the work commenced.

PROCEDURE FOR PLASTERING:

Ceiling plaster should be completed before commencement of wall plaster, plastering is started from the top (say left hand corner) and work down towards the floor. To ensure even thickness and level surface, guide point and first set on the block work, for this purpose, guide plaster about 15cm x 15cm in size is first applied at not more than 2m interval horizontally and vertically to serve as guide, they are level in the plane of finish plaster surface. After this guide

plaster has set, the plaster mix is then; laid on the wall between the gauge with trowel slightly more than the specified thickness. This is beating with wooden straight edge thoroughly, filling the joint and leveled across the gauges with small upward and sideway movements. Finally the surface is finished off with a trowel or float sandy granular texture. Excessive trowelling should be avoided. All corners, angle, junction etc. is carefully finished with proper tools. The surface levels are tested with a straight edge not less than 2.5m long and with plumb bobs.

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

5.0 CONCLUSION

This report was based on the successful Industrial Training I undergone under **Roberto Wanger** the Structure Analyst at of **MAINSTREAM FOUNDATION (ANDRITZ) JEBBA LIFE CAMP**. I will like to advice the Government to continue to mandate this program in all higher institutions in Nigeria.

5.1 RECOMMENDATION

This report is purely based on the experience I had during the course of the training. I therefore recommend that of **MAINSTREAM FOUNDATION (ANDRITZ) JEBBA LIFE CAMP** is a better place for students in all tertiary institution to undergo SIWES program. I also recommend that Government should try as much as possible to help the students in securing an industrial training placement.