TECHNICAL REPORT ON THE STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

HELD AT

LAFIAGI CONSTRUCTION COMPANY

EDU L.G.A, KWARA STATE.

PERSENTED BY:

ABDULMALIK ADAM

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THE DEPARTMENT OF CIVIL ENGINEERING, INTITUTE OF TECHNOLOGY (IOT), KWARA STATE POILYTCHNIC, ILORIN, KWARA STATE

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FROM AUGUST TO NOVEMBER 2024

PREFACE

This is a report of four months industrial training which was done as part of the requirement needed for the award of national diploma certificate which was embarked upon by the technical student after their first year of stay in school.

It is also done to enable the student's to be exposed the practical aspect of their course of study and write down what he/she has gained during the training.

The program is aimed at correcting the incompetence in the school leaving the scientific and technical in country.

DEDICATION

This report is dedicated to the Almighty Allah, the Beneficent, the merciful, the cherisher of the universe, the uncreated creator of all creatures and the most knowledgeable who seek knowledge just from himself for giving me the opportunity, privilege an understanding to participate in the student industrial work experience scheme (SIWES).

I also dedicate this report to my amiable parent Mr. and Mrs. Abdulmalik for their financial support during the course of the program. May Allah continue to bless them (AMIN).

ACKNOWLEDGEMENT

I acknowledge with sincerity the Almighty Allah. He has been in always faithful, caring, providing, sustaining, guarding and just so good to me. Glory honor and adoration be unto Almighty Allah.

My unalloyed thanks and appreciation goes to my parent MR & MRS Abdulmalik for the caring and support that has been driving me throughout the duration of my training.

I also acknowledge my colleagues in the same department, HABEEB, MUJEEB and others that are too numerous to mention. Also the efforts of my family, sister and brother.

I am also indebted to the entire staff of COMPANY most importantly the engineers on site for their contribution and support during the training, may Almighty Allah reward you abundantly (AMIN).

I also acknowledge the entire staffs and lecturers of civil engineering department. Most important my H.O.D Engr Na'Allah for their support, moral and academic impaction of knowledge.

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CHAPTER ONE

INTRODUCTION

1.1BACKGROUND

The student industrial work experience scheme (SIWES) is a skill development program being initiated by Industrial Training Fund (ITF) in the year 1973 to solve the problem of lack of adequate practical skills preparation for employment in industries by Nigerian graduates of national institutes.

The student industrial work experience scheme (SIWES) was also founded in order to expose students to industry based skills necessary for an easy transition from the classroom to the world of work, which enable students to exposed to work methods and techniques in handling equipment and machinery that may not be available in their institutions.

The scheme started with 784 students from 11 institutions with 104 suitable courses t inception in 1974. The number of students that participated in SIWES from Universities, polytechnics and colleges of education. At the end of the year 2007 was 194,890. In the year 2008, the number of the students that participated in the scheme increased to 210,390 students with over 112 suitable courses from 219 institutions.

1.2 OBJECTIVES OF SIWES

1. To provide an avenue for student in the Nigeria universities to acquire experience and industrial skills during their course of study
2. To prepare students for the work situations they are likely to meet after graduation
3. To expose the students to work methods and techniques in handling equipment and machinery that may be available in their institutions
4. To provide the opportunity to apply their theoretical knowledge in real work situation there by bridging the gap between theory and practice
5. To allow the transition phase from school to the world of working environment easier and facilitate students contact for later employment opportunity

CHAPTER TWO

BRIEF HISTORY OF THE ESTABLISHMENT

I had my student industrial training work experience scheme at Lafiagi Construction Company. For a period of four months. It is a chartered engineer and construction firm, established and registered Business Act code of 1968, and COREN. Lafiagi Construction Company Provides specialized consultancy services in different areas of engineering with particular emphasis on the Civil, highway, watered waste disposal, surveying, structural engineering, project management and industrial development planning.

At Lafiagi Construction Company. The services offered covers feasibility studies, technical surveys, investigation, design, engineering supervision and project management. Lafiagi Construction Company consultants have highly qualified experience in many fields of Engineering and offer services, which combine a broad technical background with objective view directed towards protecting the cost. The company stirs diligently to meet the needs of clients in both the public and private sectors using the latest and most advanced techniques in Engineering.

CHAPTER THREE

SITE EXPERIENCE GAINED

3.1 DESITTING and REMOVAL OF SURPLUS MATERIAL

This is the process of removing the existing surface of a road before reconstruction or resurfacing it with a suitable and desired material or pavement.

Purpose of Desitting:

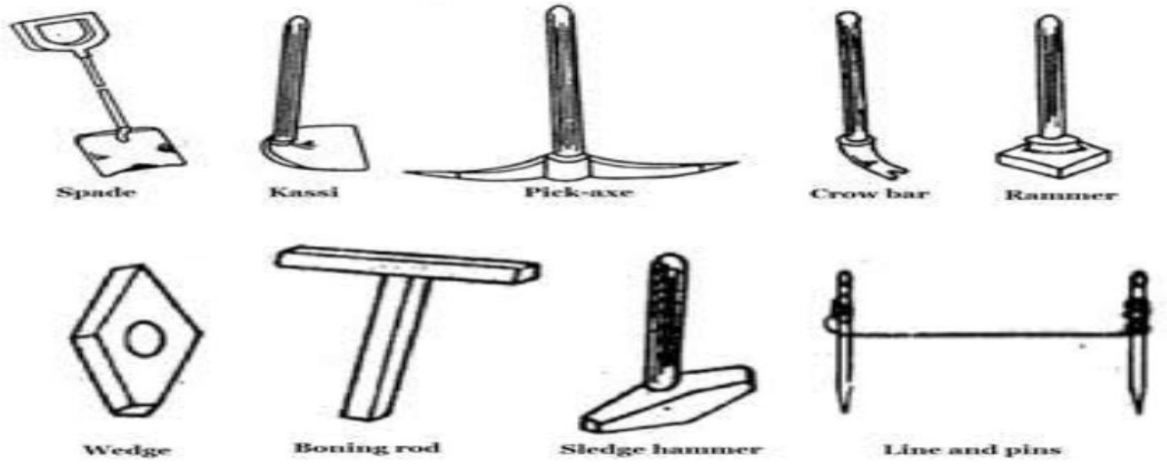
- Remove Deteriorated Surface: Desitting removes the existing asphalt layer, which may be cracked, rutted, or otherwise damaged.
- Prepare for Resurfacing: It prepares a smooth and even surface for the application of a new asphalt layer.
- Improve Drainage: Removing the existing surface allows for inspection and repair of the underlying base layers, improving drainage and preventing future damage.
- Remove Contamination: Desitting can remove any contaminants or debris that may have accumulated on the road surface.

After desitting, the materials such as top soil and vegetation are carried away from the site with a dump truck for disposal.

3.2 EXCAVATION OF ROADSIDE SURFACE DRAINAGE

This involves the digging or cart away of soil from the roadside to the designed depth and width for the purpose of drainage construction. It can be accomplished manually and with machine.

1. Manual Method: this involves the use of Man power and hand tools such as shovel, digger, and sledge hammer, hoe etc. It is very effective but time



Tools used in manual method of excavation.

• Pick-axes: for digging up the soil

• Shovels: to remove the soil been dug

• Spade: to level the bottom of the excavation and for loading onto a wheelbarrow

• Wheelbarrows to convey or cart away the excavated soil from the excavation area.

2. Mechanical method: The mechanical method of excavation involves the use of mechanical plants which are capable of multi-tasking. Examples are;

- Bulldozer: This is used to push the soil layer by layer to one side and pile it up nearby. A bulldozer is not used for digging or lifting out the soil.

• Backacter: This equipment digs down with a bucket on a boom which is jointed, and then scoops the soil towards itself. Since the bucket of a Backacter is narrow, it is useful for forming 'trenches'. It can also deposit soil on trucks or dumpers.

• Mechanical Auger: This digs pile holes. It is a huge piece of equipment which has a large drill mounted in a platform. The auger drills a hole in the ground and lifts out a column of soil.

• Dump Truck: Used for the effective movement of soil over short distances. The body of the dump truck tips forward and deposits the soil in the required position adequately.

• Tipper Truck: A typical road vehicle which os used to remove large amounts of excavated materials to locations away from the site completely. The body of the tipper truck tips up and empties the soil at the back of the vehicle.

3.3 DRAINAGE CONSTRUCTION

The road drainage system is a mechanism to effectively collect and divert all water that is gathered around the road. If adequately designed, it can help to "harvest" a large part of the runoff from the catchment uphill of the road and avoid waterlogging upstream of the road.

Stages in drainage construction

- Blinding: This is the process of making the surface of the excavated portion smooth and free from dirt with the use concrete of mix ratio 1:3:6. It also help to avoid contamination of the drainage concrete.
- Reinforcement: This is done by cutting, binding and placing of reinforcement steel in the excavated drainage trench before casting
- Formwork: This is a mould that is erected at both sides of the reinforcement to shape the drainage sidewalls. The common materials used for these are wood and metal but the one I witnessed being used was wood (marine board)
- Mixing: This is the process of adding cement, fine aggregate and course aggregate in the ratio 1:2:4 to form what is called **concrete**
- Casting: This is the process of pouring fresh concrete into the formwork either with the use of tube of headpan.
- Compaction: This is the process through which entrapped air is removed from a freshly placed concrete and packs the aggregate particles together so as to reduce the volume and increase the density of the concrete. A poker vibrator is adopted in compacting drainage concrete.
- Curing: Concrete curing is the process of maintaining adequate moisture in concrete within a proper temperature range in order to aid cement hydration at early ages. Hydration is the chemical reaction between cement and water that results in the formation of various chemicals contributing to setting and hardening. Some of the factors that affect the hydration process are the initial concrete temperature, the ambient air temperature, the dimensions of the concrete, and the mix design. Therefore, for the success of this process, in-situ concrete must have sufficient moisture and a temperature that favours this chemical reaction at a rapid and continuous rate.

3.4 EXCAVATION OF BUILDING FOUNDATION

Excavation for a foundation is the process of removing earth, rocks, and other materials to create a stable and level foundation for a building. It's a vital step in construction and sets the foundation for the rest of the project.

Considerations when excavating for a foundation:

Depth: The foundation should be at least 600 mm below ground level.

Width: The foundation should be at least three times the width of the wall it supports.

Thickness: Concrete should be at least 300 mm thick.

Soil type: The type of soil the foundation will sit on is important.

Adjacent structures: Consider the nearby structures.

Trees: Consider any nearby trees.

Drains and sewers: Consider any nearby drains and sewers.

Size and construction: Consider the size and construction of the new building.

Ground condition: Consider the condition of the ground.

Here are some methods for excavating a foundation:

Manual excavation

For small buildings, excavation can be done manually using tools like pick axes, crow bars, and spades.

Mechanical excavation

For large buildings or deep excavations, mechanical earth cutting equipment can be used.

Bottom-up method

This method involves sinking temporary diaphragm walls to the required depth, digging and removing soil, and then creating the complete hole.

3.5 CASTING OF FOUNDATION FOOTINGS

Footing is the part of the building that is in direct contact with the ground or soil is known as the footing. The purpose of a footing is to spread the load from the building across a wider area. When these footings are prepared using RCC,

they are known as RCC footings. The whole weight is dispersed to the ground by the RCC footings, which ultimately lightens the structural burden on your home's RCC foundation.

Essential steps in footings installation

1. Verify that the inner shuttering measurements (Length, Breadth, and Depth) match the size, shape, and specifications suggested by the structural and architectural engineers. Ensure the structural requirements are met for the footing.

2. Make sure the shuttering and formwork joints are watertight so that there are no water losses that could cause honeycombing or an unattractive finish. To fill any apparent gaps between shuttering panels, use shuttering tape, etc.

3. Using measuring tape and strings, preferably with a level, verify that the footing's alignment and location are per the centerline recommended by the architects.

4. Count the distance between the footings from center to center.

5. Ensure that the shuttering attached to the RCC footings is solid enough to support a load of concrete.

6. Verify the formwork used for reinforcement is flawless and error-free. RCC footing that is smooth and level.

7. Verify that the bars' diameter, quantity, spacing, and placement are per the structural designs.

RCC foundations are essential as they support the weight of the structure. For the weight to be transmitted efficiently, it is important to align them so that they are upright. The column shuttering must be strong enough to withstand the weight of freshly laid, wet concrete and remain in place while concreting.

3.6 LAYING OF FOUNDATION BLOCK WALLS

1: Build Foundation

After determining the boundaries of your project with chalk, you need to create the basis of the project. Start by making a mortar bed. Make sure that the thickness of the mortar bed is between 2.5 cm and 4 cm.

2: Place Corner Block

Place corner block in the mortar bed so that it fits the borders that you have drawn with chalk. You have to be very careful at this stage. Because the rest of the project will be shaped on this basis. Be sure to properly place the block using a variety of equipment.

3: Adjust Height

Draw lines evenly spaced of approximately 1 meter on a wooden stick so that each tier of concrete blocks can be at the proper height. When you insert the blocks, take measurements with this wooden stick. Press the blocks as much as possible to make the alignment properly. If the level of blocks is low, remove and make it again with a little more mortar.

4: Prepare Other Block

Place the other block on the side of the first block you have placed. To do this, apply mortar to the both sides of the concrete block with a trowel. Thanks to this mortar, the appropriate distance between the concrete blocks will be achieved.

5: Place Other Block

When placing the block, be sure to leave enough space that does not exceed 1 cm between the first block and the second one. Repeat these operations on all the blocks you will line up side by side.

6: Continue Laying

When you have finished laying the three blocks side by side, you can start laying another layer of concrete blocks. Before you start adding new blocks, be sure to check whether they are at balance with the spirit level.

3.7 DAMPROOF MEMBRANE (D.P.M)

Damp proofing in construction is a type of moisture control applied to building walls and floors to prevent moisture from passing into the interior spaces. Dampness problems are among the most frequent problems encountered in residences.

Typically, a damp proof membrane is a polyethylene sheet laid under a concrete slab to prevent the concrete from gaining moisture from the ground by capillary action.

3.8 SETTINGOUT

The building is set out in order to clearly define the outline of the excavation and the centre line of the walls, so that construction can be carried out exactly according to the plan. The centre line method of setting out is generally preferred and adopted.

Usually undertaken once the site has been subject to a condition survey and desk study, and has been cleared of any debris, unwanted vegetation or other obstructions. Works necessary to create the required levels may also have been completed before the setting out process begins.

The position and orientation of the structure is generally described in an architect's or engineer's drawings, defining precisely how the layout should be arranged. Controlling dimensions and references on the plans will determine the positioning of the building, and in particular its foundations. These include; overall length and width, distances to road centre-lines and to other structures, internal structural measurements and so on.

Important Concepts in Setting out

Temporary Bench Mark (TBM)

A temporary bench mark is a fixed point with a known elevation, usually ground floor level. This should be established at an early stage. It is the fixed point to which all levels are related. Where possible the TBM should relate to an ordnance bench mark. On the site, it could relate to any permanent fixture, such as a manhole cover or firmly-driven post. Typically, it is signified by a peg or steel angle that is conveniently located (eg near the site office) and concreted in or fenced off with low-level timber.

As minus signs are easily misread, the TBM position should enable all other levels to be positive. The TBM should be clearly indicated on all drawings, with all levels and vertical dimensions expressed in metres to three decimal places in relation to it.

Baseline

Typically the first layout task is establishing a baseline to which all the setting out can be related. The baseline is a straight reference line in respect to which the building's corners are located on the ground. It often coincides with the 'building line', which is the boundary of the area, or the outer boundary of a road or curb, often demarcated by the local authority.

Horizontal controls

Horizontal controls are points that have known coordinates with respect to a specific point. Other points such as layout corners can then be located. Numerous control points should be used so that each point on the plan can be precisely located on the ground.

Vertical controls

Vertical controls enable design points to be positioned at their correct levels. The vertical control points are established relative to specified vertical datum – often a timber post set in concrete. But it can also be a specific height from a nearby road or land feature.

3.9 BUILDING LAYOUT

Simple building layout, such as a rectangle, the outline of the building is marked by a line tied to corner posts - a nail in the top of the post can be used to attach the line to. A theodolite, site square or builder's square is used to turn off 90-degree angles for the remaining corners. Ranging rods may be required to establish a straight line between corner posts.

Corner posts are usually 50 x 50mm timber posts driven firmly into the ground, with a nail in the post's centre. The outline may be marked on the ground with dry lime or similar powder. Timber profile boards can be used at the corners. Profile boards are typically between 0.6-1m in height and comprise two 50 x 50mm posts driven at least 600mm into the ground, with a 150 x 38mm crossboard.

Where the outline of a building is more complex than a simple rectangle, it may be necessary to establish a range of points in the same way as for laying out a simple rectangle. However, great care is required, as small errors are more likely to be introduced as more points are positioned. Often the easiest way of laying out an irregular building shape is to first lay out a large rectangle which will enclose the entire building or the greater part of it. Once this is done, deductions and alterations can be made to obtain the precise layout required.

Trenches

The layout of trenches establishes the excavation size, shape and direction, as well as the width and position of walls. Trenches are excavated once the building

outline has been set out. The width is often marked with a line of dots of dry lime powder for accurate excavation by hand, whereas the centre line is marked for accurate machine excavation.

Outline profile boards are often used to control trench positioning, width and depth. In order that they do not obstruct the excavation work, profile boards should be set up at least 2m clear of the trench positions. The level of the profile crossboard should be related to the site datum and fixed at a convenient height above ground level, often with cords strung between two profiles at either end of the trench. Bands can be painted on the crossboard for identification purposes.

Pegs are often driven into the bottom of the trench to mark the top of the concrete strip that is subsequently poured.

The corners of walls are transferred from intersecting cord lines to mortar spots on the concrete foundations, using a spirit level for accuracy.

The cutting of trenches needs to be undertaken with great care, especially if they are to be left open for an extended period as there is the possibility of the sides caving in.

3.10 LAYING OF BLOCK WALLS

Before you start laying concrete blocks, the following materials are needed.

- Mortar
- Trowel
- Concrete blocks

Other technical equipments

The procedures are the same as that of the foundation block wall.

3.11 LINTEL

lintel or lintol is a type of beam (a horizontal structural element) that spans openings such as portals, doors, windows and fireplaces. It can be a decorative architectural element, or a combined ornamented/structural item. In the case of windows, the bottom span is referred to as a sill, but, unlike a lintel, does not serve to bear a load to ensure the integrity of the wall.

Reinforced concrete lintel beams are a popular choice for construction because they can be adapted to various architectural designs. They can be decorated in a variety of ways, including with brick slips to give the appearance of a solid brick wall.

Consideration when using reinforced concrete lintel beams include:

- The minimum width of the lintel beam should be 15 cm.
- The lintel span cannot be longer than 3.5 m above apertures.
- The reinforcing bars in RCC lintels must extend beyond 60 cm over the edge of the opening into the lintel supports.

The construction of lintel is the same as that of other structural elements. The formwork is erected across the top of the openings, the reinforcement is placed and then casting is done. More so the lintel is allow curing for some time before laying blocks on it.

CHAPTER FOUR

4.1 RECOMMENDATION

1. I would recommend that the kwara State polytechnic should improve the school by assisting the SIWES student with computer and modern technology and it would lead to create development of the school
2. I would recommend that the department of Civil Engineering in kwara State should expose student to practical skill and allow them to practice until they understand it perfectly well.

4.2 CONCLUSION

Student Industrial Work Experience Scheme is very Essential for all student to be able to understand what their cause of study will present to them after graduation and also learn beyond what you they will be able to learn in school.

SIWES is really helping student a lot by also allowing student to connect with people that are already practicing in the field. All thanks to the Government, Kwara State Polytechnic and my Department.

Reference

- Kwara State Polytechnic Students SIWES Manual