TECHNICAL REPORT ON STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

HELD AT

R.A TUNOLASE INVESTMENTS

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SUBMITTED TO

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DEDICATION

This report is dedicated to Almighty God, the creator of the whole universe for protecting my life throughout the programme and to my loving parents for their morally and financially support.

ACKNOWLEDGEMENT

All glory and adoration to Almighty God, the Lord of the universe, may his peace and blessings be on mankind, I testify that there is no other God worthy of worship except God Almighty.

Glory is to God Almighty who bestowed upon me the wisdom and knowledge to write this report. My sincere and unquantifiable appreciation goes to my father and my mother **MR. & MRS. HUSSEIN**

My gratitude also goes to my industrial based supervisors for their effort and knowledge impart to me during my industrial attachment and their support

TABLE OF CONTENTS

CHAPTER ONE

1.0 INTRODUCTION

The word SIWES refers to as student industrial work experience scheme.

It was established by industrial Training Fund (I.T.F) in 1973 and controlled by the National board for technical education (NBTE). Therefore this report book contains the highlight of what was done during the four month SIWES program from and the specific involvement and relevance of experience gained in the field of study.

However, I observed the four month attachment training programme at Kwara State Ministry of Works, Ilorin

1.1 DEFINATION OF SIWES

SIWES can be define as student industrial work experience scheme which induce practical knowledge of what the student have been broaden taught in school and express then to have both administrative and political idea.

1.2 AIM AND OBJECTIVE OF SIWES

- To give student ability to relate their theoretical in class to field operation.
- It enable student to gain more practical experience.
- It enable student to put what they have learnt to practices.
- To increase the competency of student professions in the field of study.

CHAPTHER TWO

2.0 SECTION/UNIT OF THE ORGANIZATION AND THEIR SPECIFIC FUNCTIONS

- Engineering section
- Surveyor section
- Maintenance section
- Administrative section

ENGINEERING SECTION: these are the section whose specialize in the design of structural members of material service which are beyond the normal scope of architect, example reinforce concrete frames, structural steel work etc.

SURVEYOR SECTION: these are the section who measures the land of the site plan.

MAINTENANCE SECTION: these are the section who maintain the already paved road

ADMINISTRATIVE SECTION: they coordinate the internal affairs of the organization and smooth running of the organization also contain the draught man, designer and tracer.

CHAPTER THREE

3.0 RELEVANCE OF EXPERIENCE GAINED TO STUDENT FIELD OF STUDY

During my student industrial working experience at the Kwara State ministry of town planning I have experience on the construction of building, drainage and culvert. Also I was introduced to some terms and technique used in construction.

3.1 DRAINAGE

Drainage is the construction of drain line in other to allow flow of water away from carriage way, in other to control the movement of water from damaging the road.

Types of drainage

1. Open Drainage
2. Close Drainage

METHOD OF DRAINAGE CONSTRUCTION

There are different types of drainage construction, but the most common ones constructed nowadays are:

1. Block drainage
2. Reinforced concrete drainage

1. BLOCK DRAINAGE

This is a type of drainage which is constructed using block, concrete and plastered with cement mortar. In this type of drainage, concrete prepared will be poured into the holes of the block for it to be able to withstand pressure, heavy load and prevent porosity.

2. REINFORCED CONCRETE DRAINAGE

This is a type of drainage which is constructed using reinforcement bar concrete. This type of drainage is stronger than the block drainage because of the reinforcement bar which makes it to gain strength and withstand external loadings.

CULVERT

A culvert is a structure that allows water to flow under a road, railroad, trail, or similar obstruction from one side to the other side. Typically embedded so as to be surrounded by soil, a culvert may be made from a pipe, reinforced concrete or other material.

3.3 TYPES OF CULVERT

There are various types of culvert, but the most common ones constructed nowadays are:

i. Box culvert

ii. pipe/ring culvert

This is the type of culvert usually constructed with high tensioned reinforced concrete and it is rectangular in cross- section. It may be precast concrete or in-situ concrete type.

Box Culverts are available in square or rectangular units and can be used as single of multi-unit runs, giving excellent mechancial and hydraulic performance or Box culverts are rectangular four-sided concrete structures used in managing and storing storm water

Ring Culvert

ring Culvert is an open/close drain structure inform of pipe that allows water to flow below a road.

3.5 IMPORTANT OF DRAINAGE AND CULVERT SYSTEM

Drainage and culvert are part of the requirement for the design or road. It has also been observed that water is the greatest enemy of a road, this is why road design without adequate drainage system is incomplete. Some of the function of drainage and culvert system includes:

1. To convey a flow under high, road, embankment or runways.
2. It helps to remove water from, or pass water across a road structure
3. To prevent scour of road element through erosion

Drainage and culvert are important part of highway and that is why it cannot be left out highway are as follow:

- ❖ Water retained or logged on highway surface could cause a fatal accident for moving vehicles especially those on highway speed.
- ❖ Where drainage facilities are not provided, the sides of the roadway are normally subjected to erosion.
- ❖ Seepage of water into the pavement and sub grade will cause aa structural failure of the road
- ❖ The absence or destruction of pipe culverts causes hindrance to traffic flows.

In the view of the above reasons, various types of drainage and culvert facilities are used to protect the highway against surface and sub grade water. This is designed to convey water under across, along or away from the highway in most economical, efficient and practical manner without damaging the highway or adjacent properly.

3.6 Factors to be considered in designing drainage and culvert of any type

In designing off any drainage and culvert facilities, following factors must be put into consideration:

- ❖ The amount frequency of storm runoff must be determined.
- ❖ Natural points of concentration, discharge and other hydraulic controls.
- ❖ The most efficiency disposal facilities consistent with initial cost, importance of road, maintenance cost of construction, repair, useful life, clean up, maintenance charge etc.

3.7 Equipment used in construction of drainage

- ✓ Machines used are: concrete mixer, tipper truck, excavator, dumper, water tanker and project car.
- ✓ Material used are: cement, granite, sharp sand, water, reinforcement bars, wood plank and nail
- ✓ Instrumental used are: shovel, wheel barrow, head pan, measuring tape, hammer and hand trowel.

Equipment and their use

These are the equipment used in setting out works

- Steel tape and linear tape.
- Site square.
- Builder square.
- Cowley level.
- Trammel.
- Level.
- Theodolite.
- Plumb line instrument.

Steel tape: is used for linear measurement of distance and taking of offsets in some case while linear tape is used fof taking offsets only.

Builder Square: it is used for setting out angle 90. It Is made out of timber and in ratio of 3:4:5

Cowley level: to obtain point on the ground.

Theodolite: for alignment, to define straight line to establish levels on the ground e.t.c.

CHAPTER FOUR

Roads Construction

Road surface or **pavement** is the durable surface material laid down on an area intended to sustain vehicular or foot traffic, such as a road or walkway. In the past, gravel road surfaces, cobblestone and granite setts were extensively used, but these surfaces have mostly been replaced by asphalt or concrete laid on a compacted base course. Road surfaces are frequently marked to guide traffic. Today, permeable paving methods are beginning to be used for low-impact roadways and walkways.

Asphalt

Asphalt (specifically, asphalt concrete), sometimes called flexible pavement due to the nature in which it distributes loads, has been widely used since the 1920s. The viscous nature of the bitumen binder allows asphalt concrete to sustain significant plastic deformation, although fatigue from repeated loading over time is the most common failure mechanism. Most asphalt surfaces are laid on a gravel base, which is generally at least as thick as the asphalt layer, although some 'full depth' asphalt surfaces are laid directly on the native subgrade. In areas with very soft or expansive subgrades such as clay or peat, thick gravel bases or stabilization of the subgrade with Portland cement or lime may be required. Polypropylene and polyester geosynthetics have also been used for this purpose

Concrete

Concrete surfaces (specifically, Portland cement concrete) are created using a concrete mix of Portland cement, coarse aggregate, sand and water. In virtually all modern mixes there will also be various admixtures added to increase workability, reduce the required amount of water, mitigate harmful chemical reactions and for other beneficial purposes. In many cases there will also be Portland cement substitutes added, such as fly ash. This can reduce the cost of the concrete and improve its physical properties.

Composition

Composite pavements combine a Portland cement concrete sublayer with an asphalt. They are usually used to rehabilitate existing roadways rather than in new construction.

Asphalt overlays are sometimes laid over distressed concrete to restore a smooth wearing surface.

Bituminous surface

Bituminous surface treatment (BST) or **chipseal** is used mainly on low-traffic roads, but also as a sealing coat to rejuvenate an asphalt concrete pavement. It generally consists of aggregate spread over a sprayed-on asphalt emulsion or cut-back asphalt cement. The aggregate is then embedded into the asphalt by rolling it, typically with a rubber-tired roller. This type of surface is described by a wide variety of regional terms including "chip seal", "tar and chip", "oil and stone", "seal coat", "sprayed seal] or "surface dressing

Pavers (or **paviours**), generally in the form of pre-cast concrete blocks, are often used for aesthetic purposes, or sometimes at port facilities that see long-duration pavement loading. Pavers are rarely used in areas that see high-speed vehicle traffic.

Markings

Road surface markings are used on paved roadways to provide guidance and information to drivers and pedestrians. It can be in the form of mechanical markers such as cat's eyes, botts' dots and rumble strips, or non-mechanical markers such as paints, thermoplastic, plastic and epoxy.

Pavement Construction

A highway pavement is a structure consisting of superimposed layers of processed materials above the natural soil sub-grade, whose primary function is to distribute the applied vehicle loads to the sub-grade. The pavement structure should be able to provide a surface of acceptable riding quality, adequate skid resistance, favourable light reflecting characteristics, and low noise pollution. The ultimate aim is to ensure that the transmitted stresses due to wheel load are sufficiently reduced, so that they will not exceed bearing capacity of the sub-grade. Two types of pavements are generally recognized as serving this purpose, namely flexible pavements and rigid pavements. This chapter gives an overview of pavement types, layers, and their functions, and pavement failures. Improper design of pavements leads to early failure of pavements affecting the riding quality.

Requirements of a pavement

An ideal pavement should meet the following requirements:

1. Sufficient thickness to distribute the wheel load stresses to a safe value on the sub-grade soil.
2. Structurally strong to withstand all types of stresses imposed upon it.
3. Adequate coefficient of friction to prevent skidding of vehicles,
4. Smooth surface to provide comfort to road users even at high speed.
5. Dust proof surface so that traffic safety is not impaired by reducing visibility
6. Impervious surface, so that sub-grade soil is well protected.
7. Long design life with low maintenance cost.

Types of pavements

Flexible pavements

Flexible pavements will transmit wheel load stresses to the lower layers by grain-to-grain transfer through the points of contact in the granular structure best quality to sustain maximum compressive stress, in addition to wear and tear. The lower layers will experience lesser magnitude of stress and low quality material can be used. Flexible pavements are constructed using bituminous materials. These can be either in the form of surface treatments (such as bituminous surface treatments generally found on low volume roads) or, asphalt concrete surface courses (generally used on high volume roads such as national highways).

Types of Flexible Pavements

- The following types of construction have been used in flexible pavement:
- Conventional layered flexible pavement,
- Full - depth asphalt pavement, and
- Contained rock asphalt mat (CRAM).

Conventional flexible pavements are layered systems with high quality expensive materials are placed in the top where stresses are high, and low quality cheap materials are placed in lower layers.

Full - depth asphalt pavements are constructed by placing bituminous layers directly on the soil sub-grade. This is more suitable when there is high traffic and local materials are not available.

Typical layers of a flexible pavement

Typical layers of a conventional flexible pavement includes seal coat, surface course, tack coat, binder course, prime coat, base course, sub-base course, compacted sub-grade, and natural sub-grade.

Seal Coat:

Seal coat is a thin surface treatment used to water-proof the surface and to provide skid resistance.

Tack Coat: Tack coat is a very light application of asphalt, usually asphalt emulsion diluted with water. It provides proper bonding between two layer of binder course and must be thin, uniformly cover the entire surface, and set very fast.

Prime Coat:

Prime coat is an application of low viscous cutback bitumen to an absorbent surface like granular bases on which binder layer is placed. It provides bonding between two layers. Unlike tack coat, prime coat penetrates into the layer below, plugs the voids, and forms a water tight surface.

Surface course

Surface course is the layer directly in contact with traffic loads and generally contains superior quality materials. They are usually constructed with dense graded asphalt concrete (AC). The functions and requirements of this layer are:

It provides characteristics such as friction, smoothness, drainage, etc. Also it will prevent the entrance of excessive quantities of surface water into the underlying base, sub-base and sub-grade,

It must be tough to resist the distortion under traffic and provide a smooth and skid- resistant riding surface,

It must be water proof to protect the entire base and sub-grade from the weakening effect of water.

Binder course

This layer provides the bulk of the asphalt concrete structure. It's chief purpose is to distribute load to the base course The binder course generally consists of aggregates having less asphalt and doesn't require quality as high

as the surface course, so replacing a part of the surface course by the binder course results in more economical design.

Base course

The base course is the layer of material immediately beneath the surface of binder course and it provides additional load distribution and contributes to the sub-surface drainage It may be composed of crushed stone, crushed slag, and other untreated or stabilized materials.

Sub-Base course

The sub-base course is the layer of material beneath the base course and the primary functions are to provide structural support, improve drainage, and reduce the intrusion of fines from the sub-grade in the pavement structure If the base course is open graded, then the sub-base course with more fines can serve as a filler between sub-grade and the base course A sub-base course is not always needed or used. For example, a pavement constructed over a high quality, stiff sub-grade may not need the additional features offered by a sub-base course. In such situations, sub-base course may not be provided.

Sub-grade

The top soil or sub-grade is a layer of natural soil prepared to receive the stresses from the layers above. It is essential that at no time soil sub-grade is overstressed. It should be compacted to the desirable density, near the optimum moisture content.

Rutting occurs only on flexible pavements as indicated by permanent deformation or rut depth along wheel load path. Two design methods have been used to control rutting: one to limit the vertical compressive strain on the top of subgrade and other to limit rutting to a tolerable amount (12 mm normally). Thermal cracking includes both low-temperature cracking and thermal fatigue cracking.

Rigid pavements

Rigid pavements have sufficient flexural strength to transmit the wheel load stresses to a wider area below. Compared to flexible pavement, rigid pavements are placed either directly on the prepared sub-grade or on a single layer of granular or stabilized material. Since there is only one layer of material between the concrete and the sub-grade, this layer can be called as base or sub-base course.

Pictorial Representation of Discussions

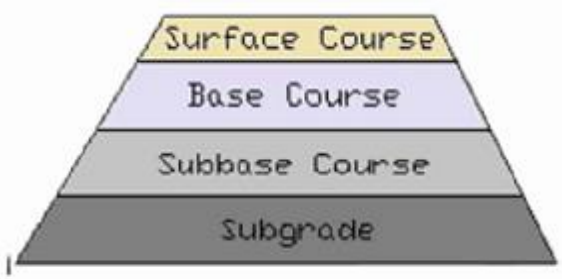

Fig 1. Section of Flexible Pavement **Fig 2. Section of Rigid Pavement**

CHAPTER FIVE

5.0 CONCLUSION

The SIWES programme is an efficient an effective program which has bring much improvement to my field of study. I have gained a llot of experience from the various works done on field such as feeding of birds, hatching of eggs and formulation of feed. It is a programme that bridges the gap between theory and practical aspect, so therefore it has made me to have technical knowledge about what I have learnt theoretically in class.

It is a unique privilege for me to undergo this training, for its enables me to know the service to render as a agricultural and bio system engineer. I here appreciate the effort to the Federal Government and Industrial Training Fund (I.T.F) for improving the technological development of this country.

5.1 PERSONAL IMPRESSION ABOUT THE ORGANIZATION

I was highly impressed about the organization towards the acceptance of my SIWES letter in their organization. Also what impressed me most about the organization is the experience gained during my training under Civil Engineering Department at R.A Tunolase Investments Ilorin. This will help me facing the future challenges that may likely to occur in my field of study.

5.2 RECOMMENDATION TO THE ORGANIZATION CONCERNING THE SIWES PROGRAMME

I would recommend that the organization should appeal to the federal government to make provision for necessary equipment for the effectiveness of the programme.

I will like to implore the organization to continue in their well accommodative standard.

I would recommend that the organization should provide transport facilities for SIWES students so as to move/carry them from the office to the site off construction.

5.3 RECOMMENDATION TO THE POLYTECHNIC CONCERNING THE SIWES PROGRAMME

I would recommend that the polytechnic should try to get a placement for the student by contacting all engineering organization to admit any student for their SIWES programme.

I would recommend that the polytechnic should try to give adequate supervision to the student in their place of attachment for student assessment before the completion of the programme.

I would recommend that the polytechnic should encourage their student to spend their training period well and try their possible best to acquire the practical knowledge on the field.