A

TECHNICAL REPORT

ON

STUDENTS' INDUSTRIAL WORK EXPERIENCE SCHEME

(SIWES)

UNDERTAKEN

AT

ONDO STATE ELECTRICITY BOARD,

QUARTER 102, ALAGBAKA, GRA,

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BY

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SUBMITTED TO:

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF ENGINEERING (B.ENG.) IN ELECTRICAL AND ELECTRONICS ENGINEERING

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CERTIFICATION

This is to certify that this report was carried out by OGUNGBURE SEMILOGO OLUSOLA with Matriculation number EEE/11/5092 in the Department of Electrical and Electronics Engineering, Federal University of Technology, Akure in partial fulfillment of the requirement for the award of Bachelor of Engineering (B.Eng.) degree in Electrical and Electronics Engineering.

…………………………………..   …………………………….

Ogungbure Semilogo Olusola   **Date:**

EEE/11/5092

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To all whom I may have skipped to acknowledge here, do know that you are always in my mind and my lips during prayers and I wish to say thanks to you all.

Above it all, my God, my King, the Iam that Iam I thank you for helping me till now, Father.

DEDICATION

The author of this report work (OGUNGBURE SEMILOGO OLUSOLA) dedicates it to the Almighty GOD, the GOD of Abraham, Isaac and Jacob, the giver of life, strength, wisdom and inspiration during and after my SIWES. Also to my siblings, especially Mr. Ogungbure Adesoji B., friends and loved ones for all their supports and prayer.

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CHAPTER ONE
INTRODUCTION

1.1 INTRODUCTION TO STUDENT WORK EXPERIENCE SCHEME

In the earlier stage of science and technology education in Nigeria, students were graduating from their respective institutions without any technical knowledge or working experience. It was in view of this that students undergoing science and technology related courses were mandated, for students in different institution in view of widening their horizons so as to enable them have the technical knowledge and working experience before graduating from their various institutions. It is in this vein that the Students' Industrial Work Experience Scheme (SIWES) was initiated.

1.2 SIWES BACKGROUND

The Students' Industrial Work Experience Scheme (SIWES) was established by the Industrial Training Fund (ITF) in 1973 to enable students of tertiary institution, especially those in Engineering, Technology, and Sciences of tertiary institutions (universities, polytechnics, monotechnic and colleges of education) have technical knowledge of industrial work based on their course of study before the completion of their program in their respective institutions so as to smoothen their entry into industrial practices on completion of their studies and also reduce periods spent in training fresh graduates as new employees. However, the Industrial Training Fund withdrew five years after its establishment because of poor funding.

As a result of increasing number of students enrolment in higher institutions of learning, the administration of this function of funding the scheme became enormous, hence, ITF withdrew from the scheme in 1978 as being said earlier and the scheme was taken over by the Federal Government and handed over to both the National Universities Commission (NUC) and the National Board for Technical Education (NBTE). By 1979, the colleges of education were not part of the scheme and later in 1984; the Federal Government reverted back to the ITF which took over the scheme officially in 1985 with funding provided by the Federal Government.

1.3 ITF VISION STATEMENT

To be the foremost skills training and development organization in Nigeria and one of the best in the world and be second to none in Nigeria.

1.4 ITF MISSION STATEMENT

To set and regulate training standards and offer direct training interventions in industrial and commercial skills training and development, using a corps of highly competent professional staff, modern techniques and technology.

1.5 OBJECTIVES OF SIWES

1) To provide an avenue for students in Nigerian higher institutions so that they can acquire industrial skill and experience in their course of study.
2) Students Industrial Work Experience Scheme provides the opportunities for practical trainings outside the institutions through attachment to industries and firms, research stations and establishments.
3) Prepare students for the work situation they are likely to meet after graduation.
4) The scheme is met to expose student to work methods and enrich their experience in acceptable methods of or techniques in handling equipment and machineries that may not be available in their various institutions..
5) Provide students opportunities to apply their theoretical knowledge in real world situation thereby bridging the gap between the university work and the act of practice.

1.6 BENEFITS OF THE STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

There are several benefits derived from SIWES, among which are:

1) It gives opportunity for students to be in direct contact with junior, immediate and senior professional staff in the industry.
2) It gives students the opportunity of getting employment if such a student proves himself worthy of getting employed, and for the industries to evaluate the prospective employers.

3) Successful SIWES operation provides the government the opportunity of reducing the importation of expatriate Engineers and professional personnel.

4) This program helps me personally in my measurement and also I was able to see the construction process.

5) The program as well enables me to become a literate in the field of using AutoCAD to design effectively with little or no supervision

6) Students on industrial Training serve as relief hands when they are properly utilized. They could even be treated as short-term employers, who could do some short-term investigation/research or handle jobs of permanent staff member on leave.

CHAPTER TWO

HISTORY OF ONDO STATE ELECTRICITY BOARD(OSEB)

2.1 Overview of the Ondo State Electricity Board (OSEB)

Ondo State Electricity Board (OSEB) was incorporated in 1987 by Ondo State Government with the purpose of transforming the rural communities and villages with electricity rapidly because of slow pace of The National Electric Power Authority (NEPA), now Power Holding Company of Nigeria (PHCN). Itsaim are to improve the Electrical Network System within the state, carries out consultancy services for both private and public firms on Electrical matters. It carries out maintenance work on electrical equipment in Government establishments such as industries and establishment etc.

2.2 SECTIONS IN THE ESTABLISHMENT

There are five (5) sections in Ondo State Electricity Board(OSEB) for effective and efficient functioning of the company.

2.2.1 Planning and design

Work done here includes site survey, sketching of drawings, development and printing of drawings obtained from the sites by the use of drawing instruments, printing machine, paper-cutting machine. Recently, the use of AutoCAD, a computer based software has been incorporated to enhance proper saving of data and to get along with the technology of the present. Today, the company has experienced a spectacular growth through the latest technology,

2.2.2 Project price inspection and monitoring unit.

This department deals with the control of prices submitted by contractors to check for accuracy. `This department deals with the maintenance of public streetlight system, government offices and parastatals.

2.2.3 Operation and maintenance

This is where facilities and equipment are kept for operation and maintenance. The maintenance ensures that equipment is kept in good conditions.

2.2.4 Accounting department

The accounting section oversees the running of money, by taking a proper record of the income and expenses of the establishment.

2.2.5 Finance and administration

Administrative jobs are done here. Financial Funds received from the government is documented here. Details about this department are located in the organization chart.

2.3 THE MAJOR OPERATIONS UNDERTAKEN AT ONDO STATE ELECTRICITY BOARD

1) Electrification project design which includes (site surveying, sketching of design outline)

2) Development and printing of drawings obtained from the sites by the use of drawing software (AutoCAD) and printing machine respectively.

3) Improving power supply to different communities in the state.

4) Supervision of electrification project.

5) Carrying out pre-commissioning test.

2.4 OSEB (ONDO STATE ELECTRICITY BOARD) VISION AND VALUE

Our vision is to be recognized, globally, for unparalleled customer service and become the primary source and stand constantly as the source of electricity for all Ondo State dwellers and to accomplish this, we identify and embrace three operating principles. These principles guide our actions in every ramifications of being the source of power for all the inhabitants of Ondo state.

1) **Quality:** Product reliability is our core service proposition. We maintain a zero-tolerance for product failure of refurbished and remanufactured equipment.

2) **Customer Support:** We adopt the objectives of our customer and dedicate our effort to achieve these goals. To sustain our relationship, we strive to understand our customer's longer-range operational objectives and adapt our services accordingly.

3) **Value-added Service**: Supplying a rebuilt part is an easy remedy. Exceeding our customers' expectations by providing services well beyond the norm for the industry is our performance expectation.

In addition to this service proposition, we have adopted several fundamental values that shape and govern our conduct in the global marketplace. You can consistently rely on our:

4) **Integrity:** We will never compromise our individual or corporate integrity for any reason. Everyone, both inside and outside the company, will be held to the highest ethical standards of honesty and integrity in all business dealings.

5) **Respect:** We serve customers throughout the Ondo state and embrace cultural and ethnic diversity. This perspective builds trust and a positive environment for conducting business.

6) **Teamwork**: Teamwork and collaboration is one of the foundations of our culture. Our integrated team of specialists, partnered with a mission-focused customer, produces extraordinary results.

7) **Leadership:** Our success depends on continuous self-improvement. We relentlessly focus on improving our technological advantage and creating cutting-edge customer service programs.

2.5 ONDO STATEELECTRICITY BOARD NEW ORGANISATION CHART

Here is the new organization chart of Ondo State Electricity board as can be seen in Figure 2.1 below, after it has been kept fixed for a while.

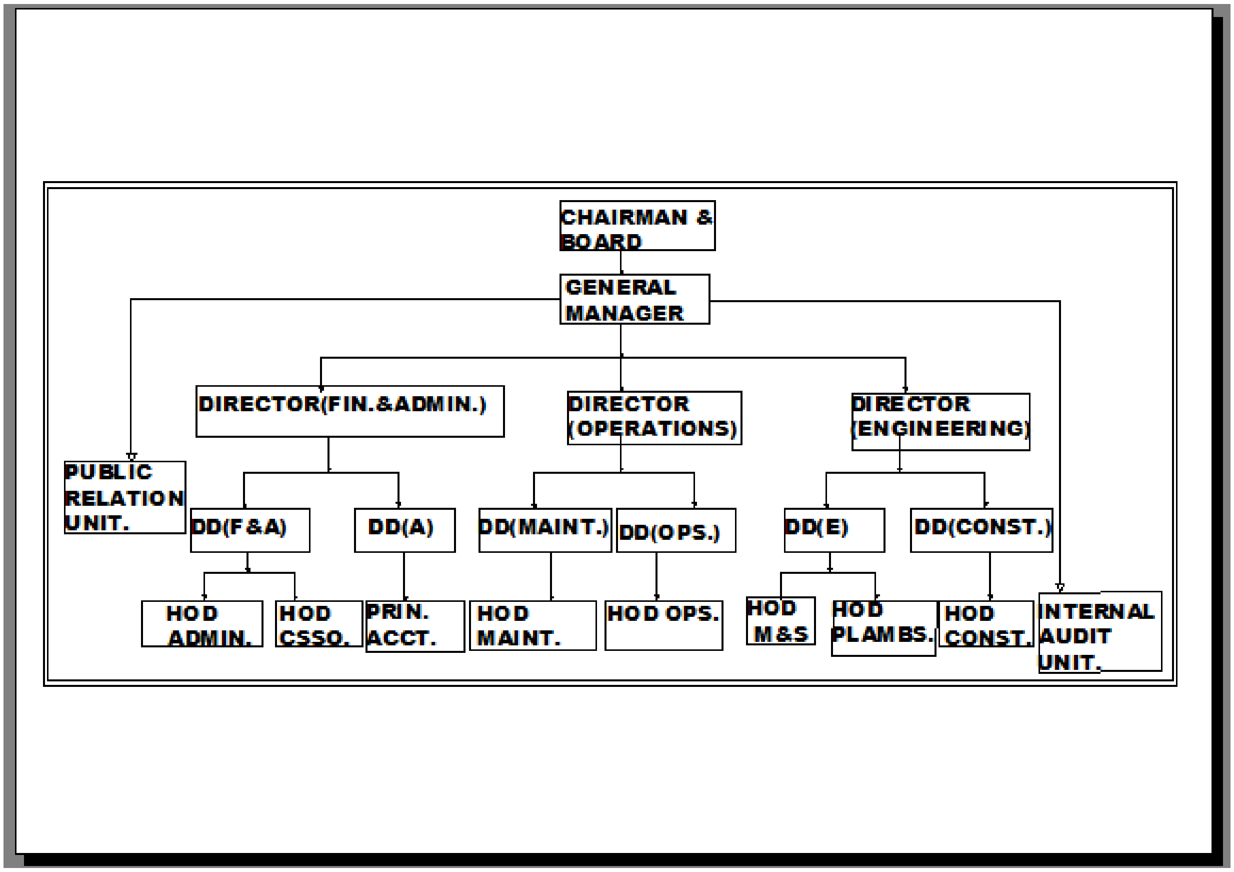


Figure 2.1: New Organization Chart

2.6 SAFETY PRECAUTIONS

In any industry or work place, safety, health and welfare of the staffs are a very personal matter that must be taken care of Safety can be defined as the method taken to prevent accidents (Federal Republic Of Nigeria, 1990)

1. You must know the hazard associated with your work.
2. You must be fully educated on how to operate a machine before you do that.
3. You must always put on your helmet and protective cloth whenever you are working on poles or testing.

2.7 SAFETY EQUIPMENT AND USES

i. **EYE PROTECTOR:** Serves as a guard against the hazards of impact, splashes from chemicals or molten metal, liquid droplets, dust, gases and welding arcs.

ii. **HEAD PROTECTOR:** This includes industrial safety helmets to protect against falling objects or impact with fixed objects;

iii. **FOOT PROTECTOR:** Includes safety boots or shoes with steel toe caps, foundry boots with steel toe caps, which are heat resistant and designed to keep out molten metal.

iv. **PROTECTIVE CLOTHING:** Types of clothing worn on the body to protect the person include coveralls, overalls and aprons to protect against heat and bad weather, and clothing to protect against machinery.

TYPES OF ACCIDENT AND CAUSES

1. Cut: Sharp objects
2. Bruises: Falling due to slippery ground e.g. oil spillage on the ground.
3. Fracture: Falling

2.8 SAFE WORKING CONDITIONS AND TECHNIQUES

Safe working conditions in the workshop, according to (Adegeye E.A., 1989) include.

1. Safe working attire (protective clothing) for the worker.
2. Uncongested working area.
3. Adequate ventilation and lighting.
4. Safe storage of tools and material.
5. Proper guarding of moving parts of machine.
6. First Aid equipment.

REQUIREMENTS FOR SAFE WORKING TECHNIQUES:

1. The right way to do a job.
2. Using the right tool for the job.
3. The correct use of tools and machines.

4. The limitations of the tools or machine.

5. Care and maintenance of tools and machine.

2.9 GENERAL ELECTRICAL SAFETY RULES

1) Ensure that a properly wired plug is used for all portable electrical equipment as listed below; Brown/Red wire - live conductor, Blue wire - neutral conductor Green/yellow/Black wire - earth conductor (America Society of Electrical Engineers,1981),
2) Never improvise by jamming wires in socket with nails or sockets.
3) Molded rubber plugs are preferable to the brittle plastic types, since they are less prone to damage.
4) You must know the hazard associated with your work.

2.10 Basic installation tools

The following tools should be found in the tools bag of an electrical Engineer. (Whitfield J.,1993)

1). Pliers (long nose, cutter, flat)
2). Log pins
3). Hand gloves
4). Cables of various sizes
5). Paper tape
6). Torchlight
7). Cable ties

CHAPTER THREE
RURAL ELECTRIFICATION

3.1 INTRODUCTION TO RURAL ELECTRIFICATION DESIGN

The relevant planning process, the design procedure and the arrangement of network equipment shall be examined and discussed accordingly. Electricity projects are designed to provide the basic infrastructural facilities for any setting's lighting, power for cottage industries, agro-allied industries etc (Gupta B.R., 2005).Well designed electricity projects guarantee efficient and reliable power supply system for the need of towns and communities. Therefore, the design phase is critical to the successful execution of any electricity project (Ewesor P.O., 1999).

Design is defined as the road map, strategic approach for achieving a unique expectation in creating an object, system, network which defines the specifications, parameters, values, cost, activities, processes "how and what " to do within legal, political, social and environmental safety and economic constraints in achieving the goals or objectives (Oyeleye S.A,2015).

3.2 TECHNICAL SPECIFICATION OF MATERIALS USED IN RURAL ELECTRIFICATION.

These are the basic equipment and materials needed for the electrification project of whatever community under consideration.

3.2.1 Substation

A substation may be defined as assemblies of electrical apparatus, which steps down high voltage level to a lower voltage level suitable for domestic consumption as can be seen in Plate 3.1 below and the exact Figure is drawn in Figure 3.1 using Auto Cad.

Plate 3.1: A typical Substation

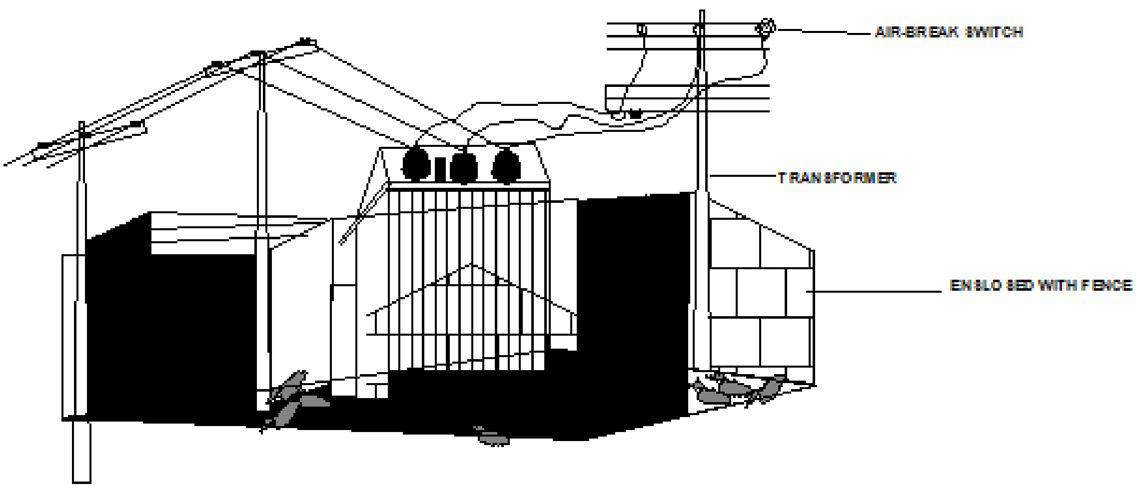


Figure 3.1: A typical Substation drawn using Auto Cad

3.2.1.1 Factors to be considered before citing a substation

There are many factors to consider before citing a sub-station, some of which are:

I. **Topography:** Nature of the land on which the substation is to be situated must be put into consideration. Such land must not be rocky and soil resistance not greater than **1.6 ohms.**

II. **Location:** A sub-station should be centrally located in order to give room for even distribution of load in the community

III. **Load Demand:** Size of the community determines the load demand. This in effect determines the type and ratings of the transformer to be installed.

IV. **Nature of transmission line:** the type of transmission line from which the sub-station is connected determines the type of transformer that will be used.

3.2.1.2 Component of distribution substation

I. **Distribution Transformer:** A transformer is a device that makes arrangement for the transfer of electrical energy from one point to another in a circuit or from one circuit to the other by the principle of electromagnetic induction. (National Electric Power Authority ,1982), this is in Figure3.3 .

II. **Feeder Pillar:** This can be defined as a box containing switch links and fuses for connecting the feeder bus bars with the distributors as can be seen in Plate3.2.

III. **Cable:** Armored cables are the most common type of cables used in a substation Depending greatly on the capacity of the transformer (Whitfield J.,1993),. Both stranded wires (cable) and solid conductors are shown in Figure 3.3 and Plate 3.4 as drawn using Auto Cad software and its picture respectively..

Plate 3.2:An opened Feeder pillar

Plate 3.3: Power transformer

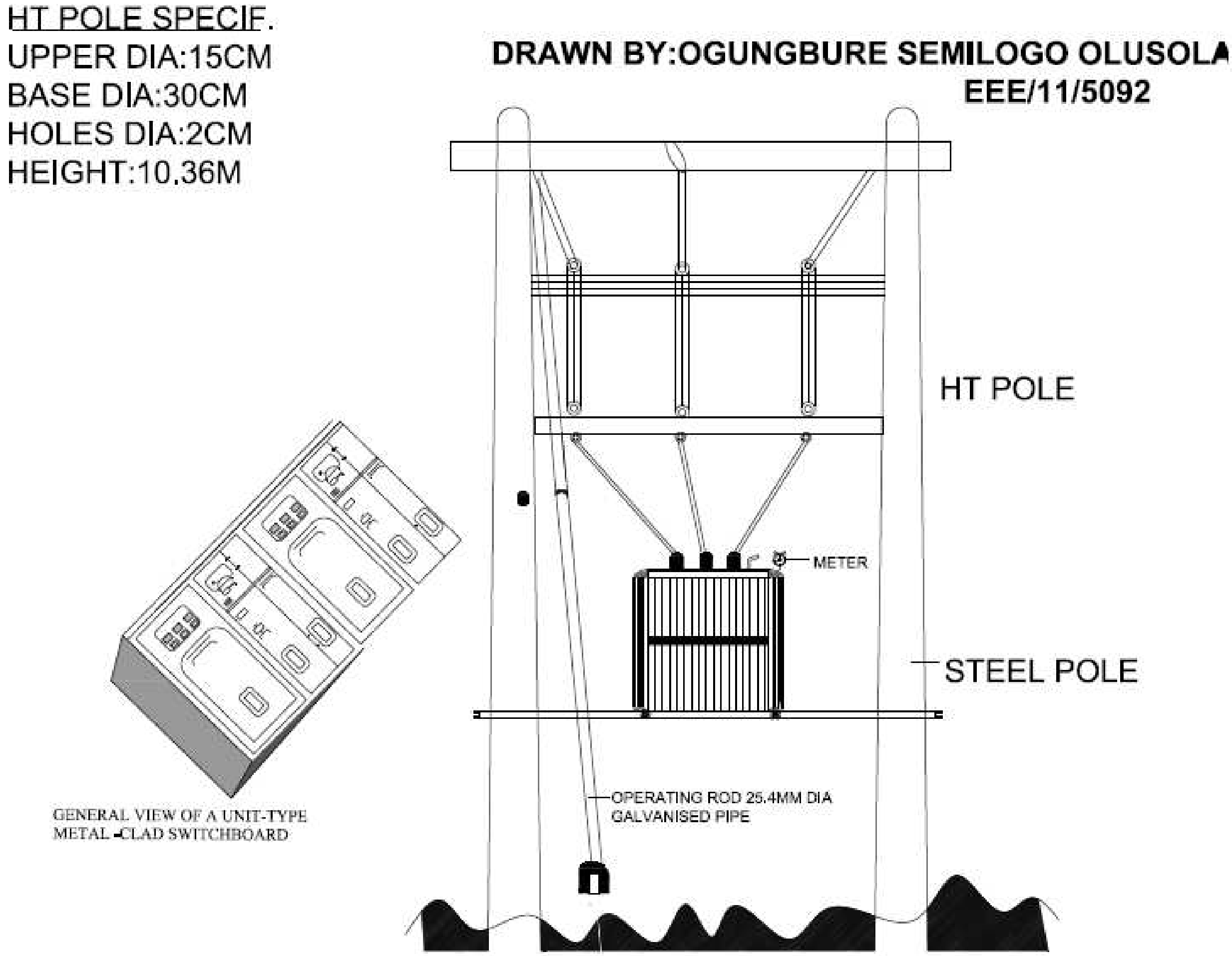


Figure 3.2: Diagrams of Switchboard and substation

3.2.2Conductor

It is the suitable wire used to distribute electricity to the consumer for concrete pole, the aluminum conductor used is $100mm^2$ as can be seen in Figure 3.4 and for wooden pole, the aluminium conductor used is $70mm^2$,$35mm^2$ for street lights(Federal Republic Of Nigeria ,1990)

Plate 3.4: A typical roll of stranded conductor

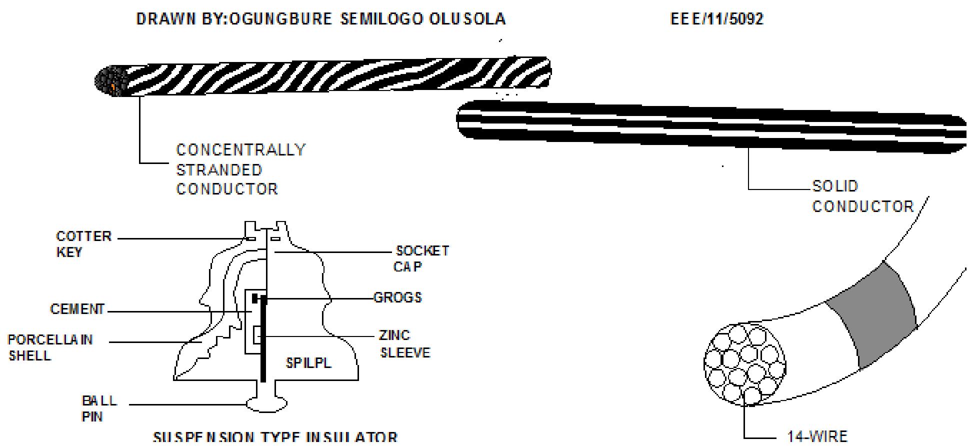


Figure 3.3: A Stranded conductor, Solid conductor and Suspension type insulator

3.2.3 Insulators

These provide the necessary insulation between the line conductors and support; it prevents leakage current from the conductor to the earth as can be seen in Plate 3.5. A good insulator must have the following properties.

1) High electrical resistance insulating material

2) High mechanical strength to withstand the conductor’s weight with load.

3) The insulator material should be non-porous, pure and crack free.

Plate 3.5: Typical pictures of Tension insulator and Pot Insulator

3.2.4 Isolators

Isolators are three-phase group operated. All isolators are to be pole mounted and manually operated. The hand mechanism shall be operated from the ground and provided with a mechanical locking device as well as position indicators mounted near the later device. As can be seen in Figure 3.4, while the fixing process is shown in Plate 3.6.

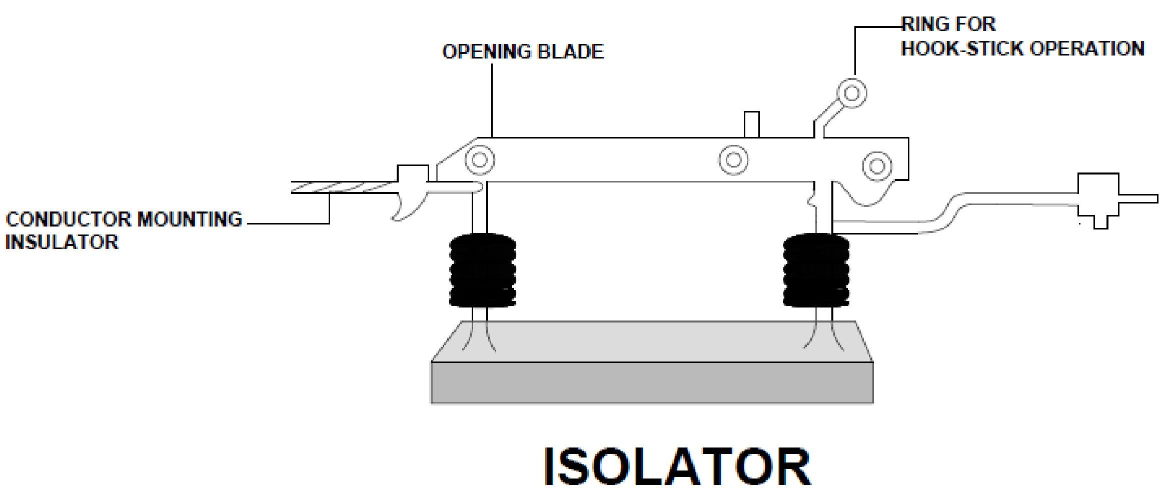


Figure 3.4: A typical diagram of an Isolator drawn with Auto Cad

Plate 3.6:An Isolator and its fixing process in progress

3.2.5 Fuse

High Rupture Capacity (HRC) fuses shall be used for the protection of the **incoming feeder. Cartridge fuses** are used for the outgoing feeders. It protects the transformer against surge and lightening. A fuses cut are selected based on ,the type of the system, the system voltage, the maximum fault current at point of application(Gupta B.R,2005)A typical High Rupture Capacity (HRC) fuses is shown in Figure 3.5.

Thunder/ lightning arrester

It shatters when lightening comes in contact or arrests it. The function of this equipment is to allow the discharge of any dangerous over voltage before it damages the electrical equipment. It is restored to normal operation after the discharge.

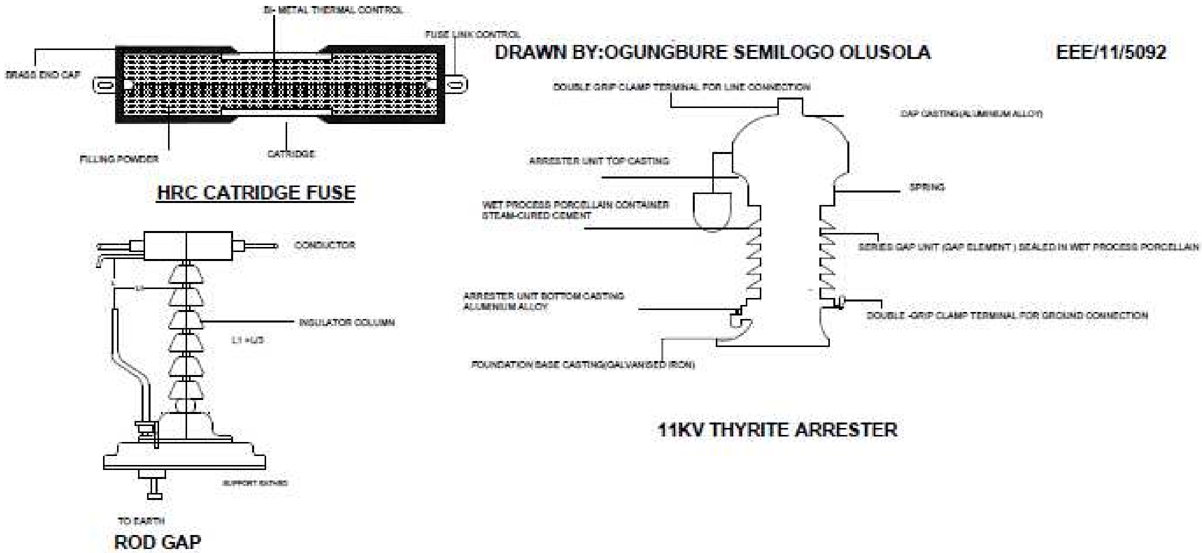


Figure 3.5: HRC fuse, Thunder arrester, and Rod gap

3.2.6 Cross-arm channel/ angle iron.

6 feet long wooden cross-arms were recommended. Cross arm is used to suspend the aluminum conductor and also to pilot it. Its length is **9ft for 33Kv** and **6ft for 11kv.**

3.2.7 Pole and support.

These are the supporting structures for overhead line conductors. They are poles and towers use in electrification projects. A good pole must have high mechanical strength, cheap in cost and economical to maintain and has long span .The Figure 3.6 and the Plate 3.7 below are for poles and support drawn with Auto Cad and picture respectively .

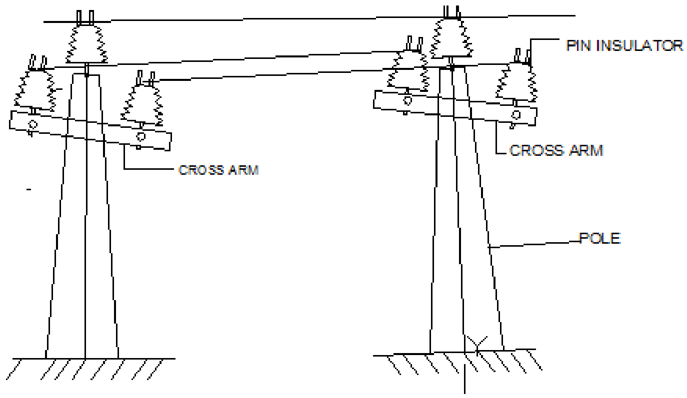


Figure 3.6:Pole and Support

Plate 3.7: A typical picture of poles

3.2.8 High tension (H-T) fuse or Johnson/ Philip (J&P) fuse

It is a protective device; it protects the transformer against high voltage or surge. It breaks when excess voltage enters the circuit by disconnecting one phase of the feeder pillar and this causes some people to experience high voltage and others low voltage. Below is a picture of J&P fuse shown in Plate 3.8.

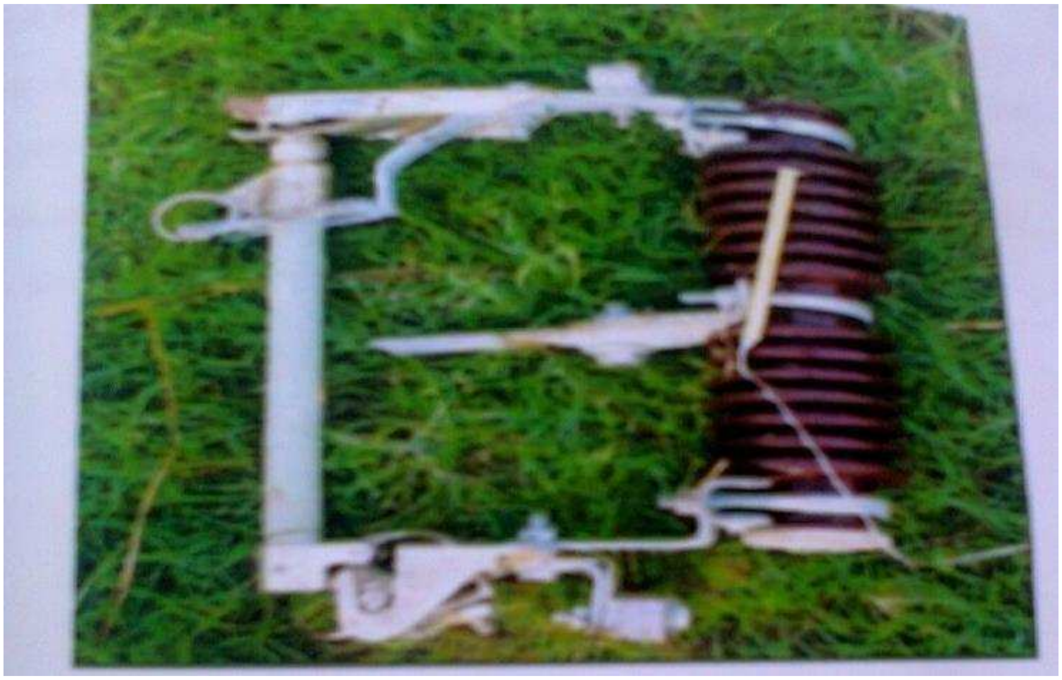


Plate 3.8: J&P fuse

3.2.9 XLPE/DROPPER/JUMPER/ARMOUR PVC CABLE

It is also known as up riser. It is used to raise the feeder to the pole and drops electricity from the high tension side through the protecting devices (clevis adaptor, tension clamp e t c) to the transformer.

Ground terminal

This is when the bottom of the lightening arrestor is connected to a copper wire and bridged together with the three lightening arrestors and grounded to earth. (Riley R. P.,1990)

3.3 INTRODUCTION TO AUTOCAD SOFTWARE

AutoCAD is the engineer's and architects best friend. AutoCAD (Computer Aided Design) created by Autodesk, and first released way back in 1982, and is currently in its 18th generation ,applies to a wide range of programs that allow the user to created drawings, plans, and designs electronically (Clark, 2011) . AutoCAD is one such program and it main claim to fame is that it is relatively easy to use, it is very comprehensive in its ability to create 2D and some 3D drawings, and it is very popular. Seventy percent of the CAD users in the world use AutoCAD. The most basic building blocks of AutoCAD are called “entities”, and they are created within the program with the purpose of being manipulated and changed to meet the needs of the users and to help them create the designs they see in their head. These entities are manipulated through the use of commands, and effective use of your mouse. As can be seen in Figure 3.7.

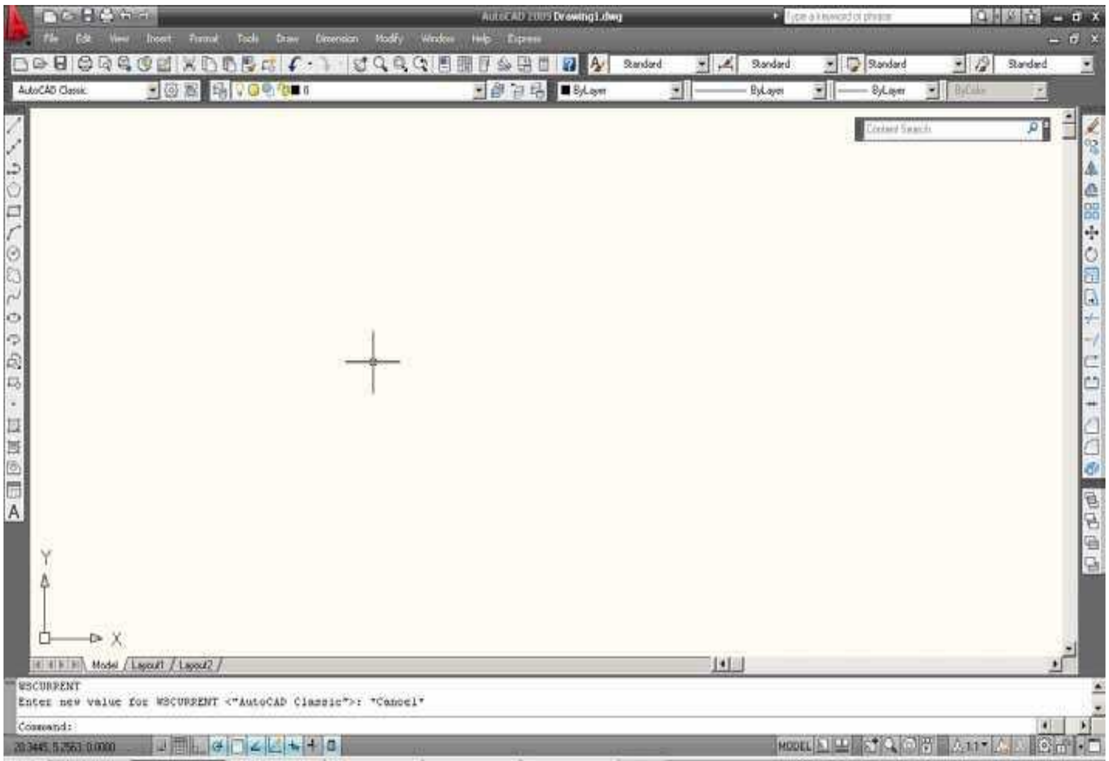


Figure 3.7: A typical interface of Auto Cad software

3.4 CLASSIFICATIONS OF COMMANDS IN AUTOCAD USED FOR ELECTRIFICATION DESIGN

Efficient use of external mouse is require for manipulating the diagram as can be seen in Figure 3.8

1) **Enquiry command**: This final group of AutoCAD commands is used to obtain information a drawing’s object’s position and nature. Are List, Dist, and Area.
2) **Commands that change existing entities**: These commands allow different editing changes to be made to existing entities. They are change, Pedit, Break, Trim, Extend, Fillet, Chamfer, Divide, and Measure.
3) **Error recovery command:** These commands bring back errors made during the editing process. They are U, redo, undo.

4) **Transformation commands:** Following group of commands allows the user to select a group of objects that need to be transformed in one way or another. They are move copy, rotate scale ,stretch , array , offset.

5) **Deletion commands**: Only two commands are in this group, used to delete objects and entities. They are Erase, Oop.

3.5 DRAWING TOOLS

These are shown in Table 3.1.The drawing tools applicable are ucs (user coordinate system), Snap ,Grid Axis, Ortho, ,Aperture.

1) **Drawing manipulation commands:**

These commands alter your drawings, allowing you to enlarge and reduce views, maintain graphic accuracy, and manipulate space and viewports, among other things.

Moving around the drawing area: With the following commands you can move around the drawing area. They are Zoom Scale, Zoom Extents, Zoom All, Zoom Window, Zoom Center, Zoom Left Corner, Zoom Previous, Zoom Dynamic, Pan, Vpoint, Dview, Plan,

2) **Utility commands:** These are some basic and useful commands that may be used more than other more specific commands. They are Redraw, Save , End ,Quit

3) **Commands for drawing entities**: Once the drawing environment has been set, these commands are used to actually draw the entities. They are Line, Point , Circle , Arc , Ellipse, Pline, Polygon, Hatch, Bhatch , Dtext.

4) **Commands for setting the drawing environment**: These commands may be used at any time, but are mainly called upon more during the beginning of the drawing process: They are units, limits, qtext ,viewers, blipmode ,fill , status,

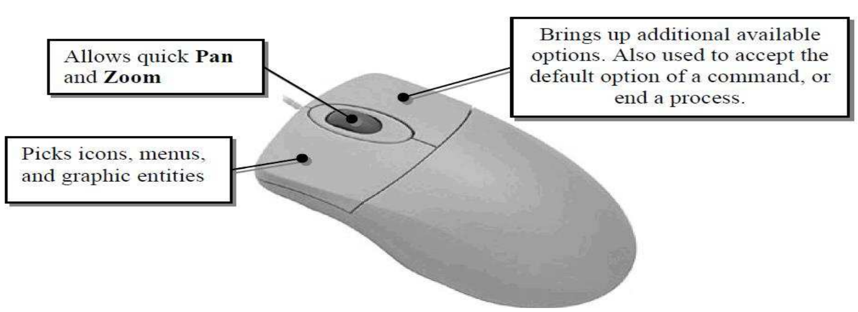
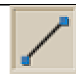
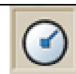
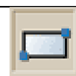
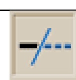
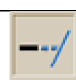
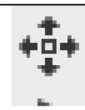
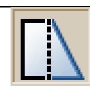
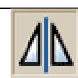
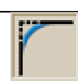
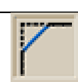
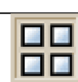


Figure 3.8: Different ways to use mouse

3.6 SUMMARY OF THE COMMAND IN TABULAR FORM REPRESENTATION:

Table 3.1: Commonly used commands in Auto Cad 2D

COMMAND	KEYSTROKE	ICON	MENU	RESULT
Line	Line/L		Draw>Line	Draw a straight line segment from one point to the next
Circle	Circle/C		Draw>Circle>Centre,Radius	Draw a circle based on a centre point and radius
Erase	Erase/E		Modify>Erase	Erase an object
Print	Print/plotCtrl+p		File>print	Enable the print /plot configuration dialog box
Rectangle	RECTANGLE/REC		Draw>Rectangle	Draws a rectangle after you enter one corner and then the second
Multi Lines	MLINE/ML	No Icon	Draw>Multiline	Draw straight lines base on the parameter you define
Trim	TRIM/TR		Modify>Trim	Trims object to a selected cutting edge
Extend	EXTEND/EX		Modify>Extend	Extends objects to a selected boundary edge

Object snaps	OSNAP/OS/F3		Tools>Object Snap settings	Brings up OSNAP dialog box
Offset	OFFSET/O		Modify>offset	Offsets an object(parallel) by a set distance
Move	Move/M		Modify>Move	Moves an object or objects
Copy	Copy/CP		Modify > Copy	Copies object(s) once or multiple times
Stretch	**Stretch / S**		Modify > Stretch	Stretches an object after you have selected a portion of it
Mirror	**Mirror / MI**		Modify > Mirror	Creates a mirror image of an object or selection set
Rotate	**Rotate / RO**		Modify > Rotate	Rotates objects to a certain angle
Fillet	**Fillet / F**		Modify > Fillet	Modify > Fillet
Chamfer	**Chamfer / CHA**		Modify > Chamfer	Creates an angled corner between two lines
Array	**Array / AR**		Modify > Array	Creates a repeating pattern of the selected objects

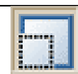
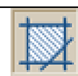
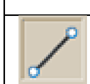
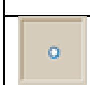
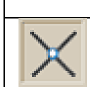
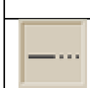
Layer	**Layer / LA**		Format > Layer	Starts the Layer and Linetype property dialog box
Text	**Text**	No Icon	Draw > Single Line Text	Creates a single line of text
Dimension	**Dim**	Many	Dimension > (*pick one*)	Dimensions previously drawn objects
Scale	**Scale / SC**		Modify > Scale	Proportionately resizes (or scales) objects
Boundary	**Bhatch / H**		Draw > Hatch	Covers an area with a predefined pattern
Hatch Edit	**HatchEdit**		Modify > Object Hatch...	Edits an existing Hatch

Table 3.2: Icons and their meanings

	End point
	Center
	Node
	Quadrant
	Intersection
	Extension

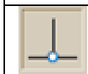
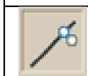
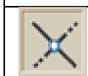
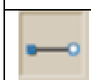
	Intersection point
	Perpendicular
	Tangent
	Nearest
	Apparent intersection
	Parallel
	None
	Osnap setting
	Temporary Tracking Point

Table 3.3: To Move around the drawing area

COMMAND OPTION	**ICON**	**DESCRIPTION**
Zoom Window		This option (also a 'hidden' fault) prompts the user to pick o corners of a box on the sting view in order to enlarge t area to fill the display
Zoom Realtime		Realtime provides interactive zooming capability. Pressing <ENTER> (after entering zoom) on the command line automatically places you in Realtime mode.

Aerial View command: **DSVIEWER**	None	Aerial View is a zooming tool that displays a view of the drawing in a separate window so that you can quickly move to that area.
Zoom Object		This option asks you to select an object or objects, then press <ENTER> and the screen will zoom to those objects only. This is great for when you want to work on object.
Zoom In		Clicking this icon will zoom in to the drawing by about 50%.
Zoom Out		Similar to 'Zoom In' - this icon will zoom out of your drawing and allow you to see about 50% more of your drawing space.
Mouse Scroll	**-**	If you have a scrolling wheel on your mouse, you can use it to zoom in and out of your drawing..
PAN		Panning allows you to quickly move around the drawing area at the same magnification you currently have set.

Table3.4: Operation on the window and diagram drawn

RIGHT TO LEFT	CROSSING SELECTION		Selects any object that either crosses the boundary or is inside it
left to right	window selections		selects on the objects that are completely within the box

CHAPTER FOUR

EXPERIENCE GAINED/WORKDONE

My student industrial work experience scheme (SIWES) which was undertaken at Ondo State Electricity Board, Akure, Ondo State under the department of project and Design has really helped me a lot such that all the diagrams in this report and my logbook were drawn with Auto Cad software. I was able to have effectively taught more than 10(ten) students both in the company and outside the company. Some of the electrical power system devices are provided at the appendice. Below is the outline of the experience I gained.

4.1 RURAL ELECTRIFICATION OF EMILORO COMMUNITY OFF ODA ROAD AKURE

Rural electrification: is the process of providing electrical power to rural and remote areas. For rural electrification to take place in a community there are some factors that influence the government decision on the electrification of that community.

These factors are;

i. Economic viability of the community.

ii. Potential for industrial growth.

iii. Political consideration.

iv. Proximity to PHCN grid.

This is done majorly in new communities where they have no electric power supply.

4.2 THE STEPS INVOLVED IN ELECTRIFYING A COMMUNITY INCLUDE;

Although, some of these steps were not actually seen physically but were only being explained verbally, such as pre- commissioning test, substation installation, but the rest were witnessed to some extent.

a. Line tracing/surveying and pegging
b. Bush clearing
c. Pole position Sighting and Pegging

d. Digging of hole
e. Erection of poles
f. Dressing of poles
g. Stringing of lines
h. Substation Installation
i. Pre-commissioning test.
j. Earthling
k. Hooking up

4.3 CONTRIBUTIONS OF PROJECT DESIGN AND SUPERVISION DEPARTMENT IN THE ELECTRIFICATION STAGES

(1) Line tracing/surveying and pegging

(2) Performing pole dressing inspection

(3) Performing as built /pole schedule.

(4) Carrying out pre-commissioning test.

4.4.1 INTER-TOWN CONNECTION (ITC) NETWORK

Inter- town connection (ITC) in electrification is the networking of two or more towns or states. It basically involves high tension lines i.e. voltage levels of around 132Kv, 33Kv and 11Kv.

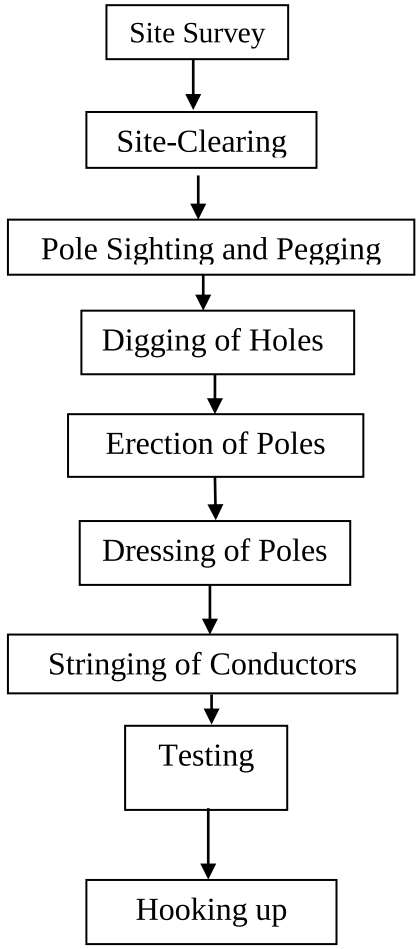


Figure 4.1: A Chart showing the steps involved in rural electrification

4.4.2 Surveying of Site

In the surveying of site for ITC, the terrain of the area or route to be affected should be taken into consideration. The terrains include sloppy areas, bends, swampy areas, hills, bridges, junctions. A typical survey process is going on as it can be seen in Figure 4.1 and the immediate step that follows ,which is the design of the sketched network using Auto Cad software in Figure 4.2. The number of kilometer from the starting point of the project to the hook-up point is noted.

Plate 4.1: While survey with hand sketch diagram is ongoing.

Plate 4.2: Drawing the sketch made with Auto Cad

4.4.3 ELECTRIFICATION DESIGN OF EMILORO COMMUNITY OFF ODA ROAD AKURE

HOW TO DO THE PRINTOUT OF THE DESIGN MADE

To do the print out of the design made requires you to select the icon in Figure 4.2, and select the printer machine you want to use, select the paper size e.g. A4, A5, A3 as the case may be. Then select the plot area from left to the right, select the plot offset to be center, so that the diagram will be at the center of the paper.

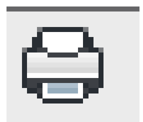


Figure 4.2:Icon for saving drawing

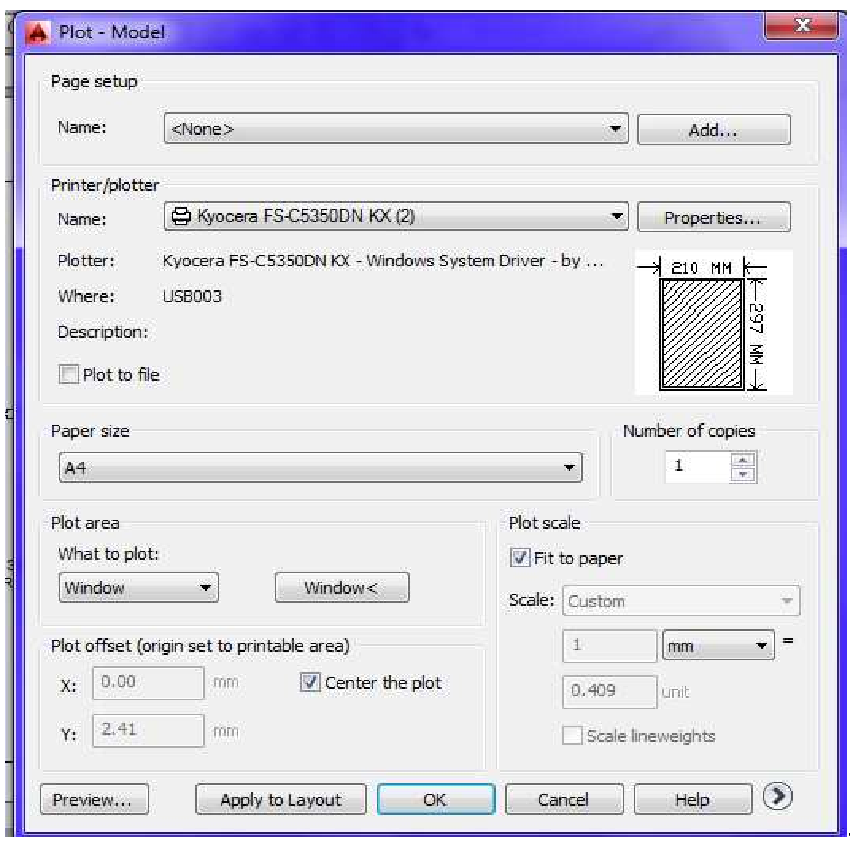


Figure 4.3: The process of Making the print out

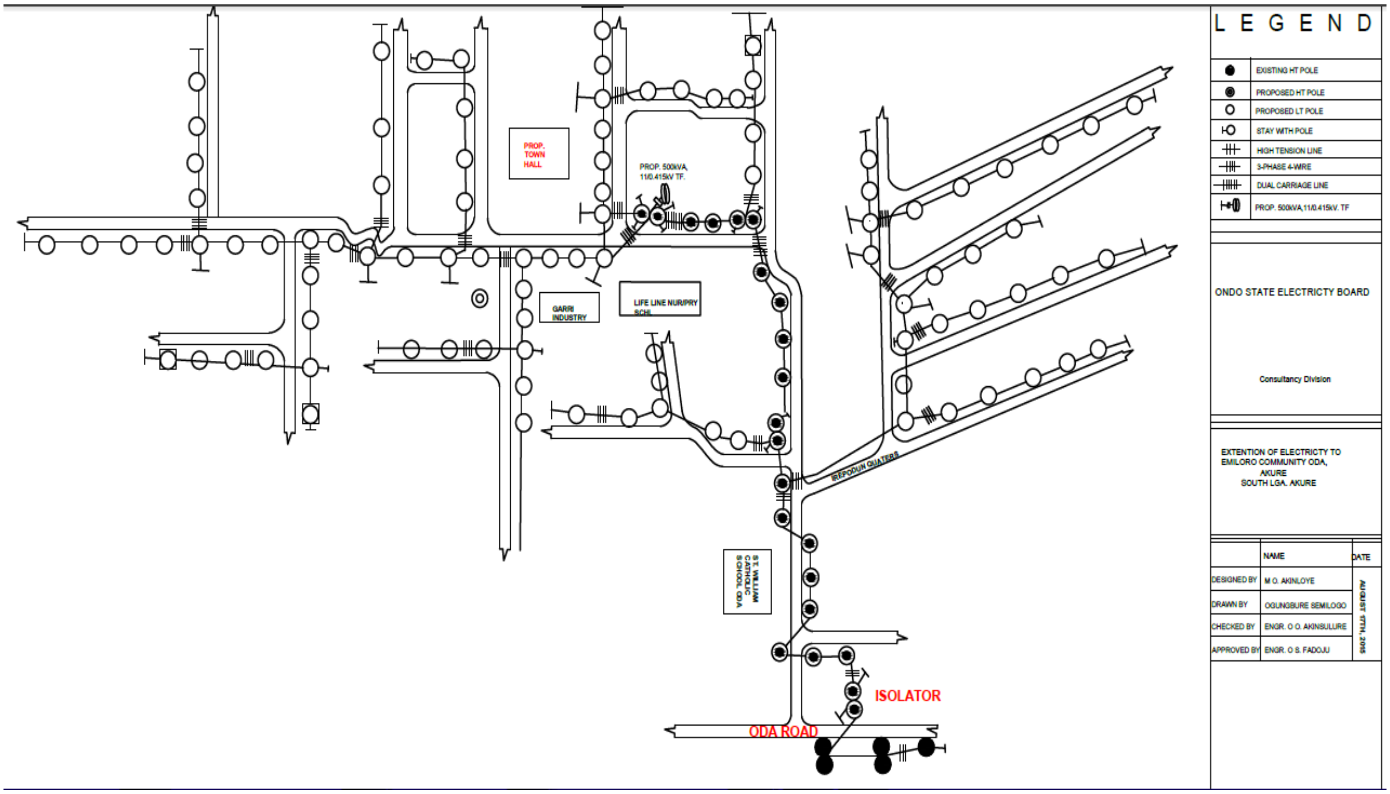


Figure 4.4: A typical electrification design made with Auto Cad

INTERPRETATION OF THE LEGEND

The interpretation of the elements used on the legend matters a lot as can be seen in table 4.5 and table 4.6.

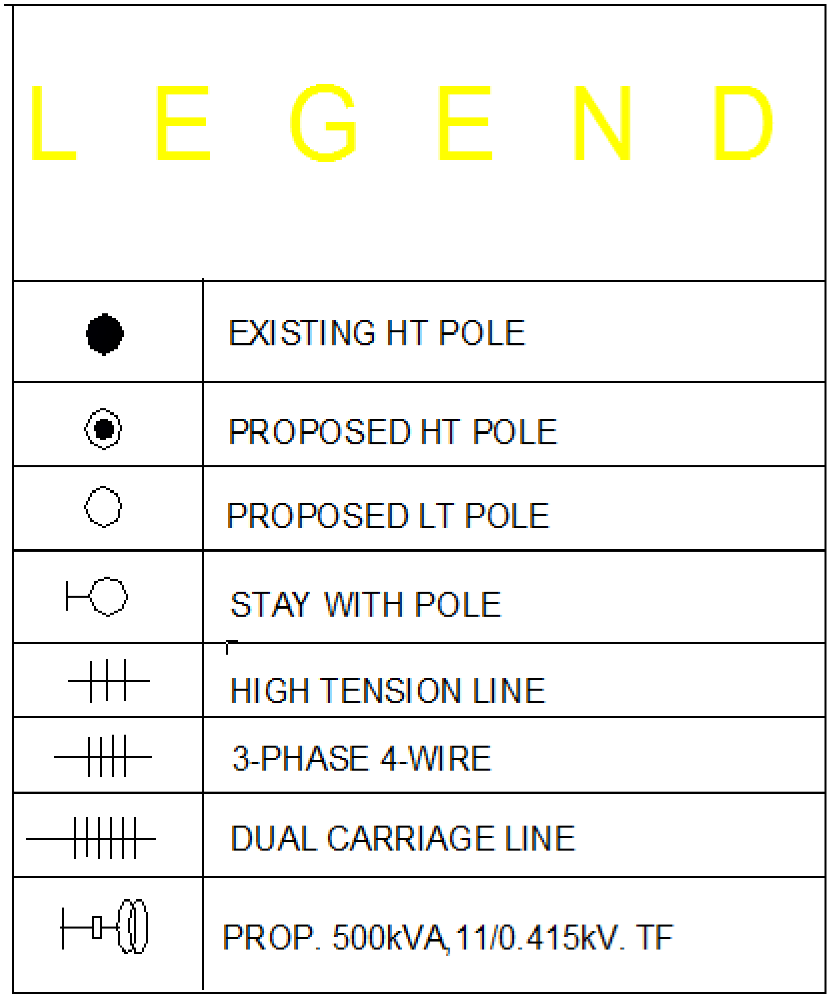


Figure 4.5: Interpretation of Legend

ONDO STATE ELECTRICTY BOARD Consultancy Division		
EXTENTION OF ELECTRICTY TO EMILORO COMMUNITY ODA, AKURE SOUTH LGA. AKURE		
	NAME	DATE
DESIGNED BY	M O. AKINLOYE	AUGUST 17TH, 2015
DRAWN BY	OGUNGBURE SEMILOGO	
CHECKED BY	ENGR. O O. AKINSULURE	
APPROVED BY	ENGR. O S. FADOJU	

MISCELLANEOUS ELEMENTS USED IN LEGEND

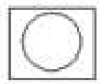
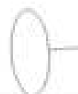
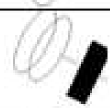
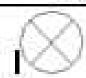
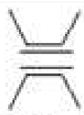
	Pole with Reinforcement
	Proposed Street light
	Existing 500KVA 33/11KV Transformer
	Existing LT pole
	Bridge
	Swampy area

Figure 4.6: Legend and the meaning of each element used on it

4.4.5 Clearing of Site

This process involves cutting of grasses and felling of trees along the proposed transmission route and creating paths for erecting the High tension poles. A typical clearing of site is ongoing as can be seen in Figure 4.7.

Figure: 4.7: Clearing of Site (Kempt west incorporated, 2013)

4.4.6 Pole position sighting and pegging.

Pole position Sighting is done to ensure a straight line in places where the pole will be erected. Sighting involves the use of rods made of steel or alternatively. A typical picture in Figure 4.8 depicts pole sighting and pegging process in progress.

Figure 4.8: Pole position Sighting and pegging (CXI PT5500 Pole sighting and pegging , 2011)

4.4.7 Digging of holes

Digging of holes are done manually by the use of long diggers and long packing spades for packing the earth deposits removed as a result of the hole dug. The equation (4.1) that follows helps us to know what should be the depth of the hole for either HT or LT pole and the dimension can be converted to feet and this can be seen in Figure 4.9.

Figure 4.9: Digging hole

Depths of holes were determined using the established formula.

D = $(10^{-1}H_x + 0.6)$…………………………………… (4.1)

While D= depth of hole, H =height of pole

Thus for HT poles, H =10.36m

D = $(10.36 \times 10^{-1} + 0.6)$ m

=1.636m

Thus for LT poles, H = 8.5m

D = $(8.5 \times 10^{-1} + 0.6)$ m

=1.45m

The depth of LT and HT poles were dug at 1.4m and 1.6m respectively using the above generic equation 4.1. The ITC poles were 60m/70m/90m apart while TDN poles were 45m/50m away from each other.

4.4.8 Erection of poles

A mobile crane 'HIAB 'does the erection of poles mechanically. A part of the vehicle made of hydraulic system is used for lifting the pole into the hole as can be seen in Plate 4.4 below.

Plate 4.4: Erection of pole (Lift-all investment company,2003/2015)

4.4.9 Dressing of poles

Poles are dressed shortly after erection. Dressing involves the fixing of channel iron or cross arms, tie-straps, pot insulators and all other accessories on the pole as can be seen in Plate 4.5.

Plate 4.5: Dressing of pole

4.5.0 Stringing of conductor

Stringing of aluminum conductor are on aligned electric poles. There are two sectional poles in every section. When the conductor is hung at the first pole, they will pull towards the second pole with the help of pull lift; the phases will then be pulled and tensioned without sagging as can be seen exactly in Figure 4.6 below.

Plate 4.6: Stringing of line (EEP , Guidelines For The Construction 2013)

4.5.1 Civil work on transformer substation

The fence measuring 5m x 5m x 5m with perforation was constructed to prevent unauthorized access to the substation. The transformer and the feeder pillar were positioned on the plinths. A steel gate was constructed and firmly earthed.

Transformer and feeder pillar connections.

The primary side of the transformer was connected to the high tension lines via a J & P fuse by $50mm^2$ (15m) single core PVC conductor while the secondary side of the transformer was connected to the feeder pillar via 1 x $300mm^2$ armored copper cables at 10m per phase and neutral.

Earthing

Copper conductor is connected to the channel iron at the top of the pole. It is passed down and connected to the earth rod, which is driven down four feet beneath the earth. Caven B.,(1988)

4.5.2 Pre-commissioning test

The As-built drawings and the pole schedule are prepared for the analysis of the whole project. Copies of these drawings are sent to three different bodies that will carry out the test.

The three bodies are:

(a) Management and supervision department of the Ondo State Electricity Board.

(b) Federal Ministry of Mines, Power and Steel electrical inspection division.

(c) Rural electrification department of PHCN.

The major reason for inviting these two external bodies is to access and issue complete certificate on the project while the PHCN is to take over the installation.

4.5.3 Testing

These are to ensure suitability, fitness and the reliability of materials and equipment used for the complete electrical installation and the electricity projects before they are commissioned for use. They are also to ensure the safety of operation of the installation or network. Ewesor P.O.,(2000).

4.5.4 Hooking up: This is the final stage in rural electrification and it has to do with the connection of new line to the existing 33kV line or 11kV line that is energizing the line as can be seen in Figure 4.7.

Plate 4.7: An ongoing project and a completed project

After hooking up stage is reached and fulfilled then there will be an energizing of the power system.

4.6 SEQUENCE OF POWER SUPPLY

This is the arrangement of power supply from the HT pole to the final sub-circuit (consumer) (National Electric Power Authority,1982).

1. Supply is from the pole to the distribution line which is low tension supply(3 phase 4 wires)
2. From the distribution line, current passes through 16mm aluminum wire or recline wire to the house. It is known as service wire.
3. The service line is then connected to the MCB (Miniature Circuit Breaker)/Cut out fuse. The function of MCB is to trip-off when excess current enters the meter at home

4. From the cut-out, current then passes through copper wire (16mm or 10mm or 6mm) depending on the load of the consumer to the meter
5. The meter stores the total consumption
6. From the meter, current passes through copper wire to the distribution fuse board
7. From the distribution fuse board to final circuit which is then connected to appliance like fridge, iron, AC etc

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Sincerely, my six month Industrial Training at Ondo State Electricity Board (OSEB) has been of great benefit to me as a student because it has helped me understand the principle of surveying line, material and site preparation for installations. It has broadened my knowledge, exposed me to the outside world and helped boost my confidence in relating with clients. It also helped me to foster my students' moral and social relationship with people outside the immediate environment. Conclusively, I will like to appreciate the Industrial Training Unit (ITU) of the school as well as the IT coordinator of this noble Institution (FUTA) for giving us the orientation program which formed the basis for preparing us for the challenges we might meet during the Industrial Training.

5.2 RECOMMENDATIONS

Based on the experience I acquired and the training I received during the SIWES program, I hereby make the following recommendations:

FOR STUDENTS

Students on attachment must carefully record all training activities and other assignments in the log-book daily, complete ITF Form 8 and submit them to ensure proper assessment which is used in payment of their allowances.

TO THE UNIVERSITY

Regular visit and monitoring of the students who are on Industrial Training should be ensured in order to enhance the effectiveness of the training. Also, students who have difficulties in securing placement should be helped to secure appropriate places. Links and affiliations should be made between Universities and Companies to ease securing placement.

TO THE INDUSTRIES

Students' industrial Work Experience Scheme (SIWES) programme should be seen as a special opportunity to help the school to practically train students so as to be able to produce potential and practically sound graduates.

FOR ITF

1) ITF should ensure the regular visitation of the ITF officers to Supervising Agencies Institutions, Employers and students on attachment.

2) The log-book issued to students at attachment by institutions must be checked and signed by the institutions' and ITF Supervisors responsible during supervision not in their offices at the end of attachment.

3) ITF should be providing insurance cover to students on attachment and improve on paying Students and supervisor's allowances for motivation.

4) The SIWES coordinators, ITF agencies, and Area office should institute their machinery to quicken the vetting of students log-books.

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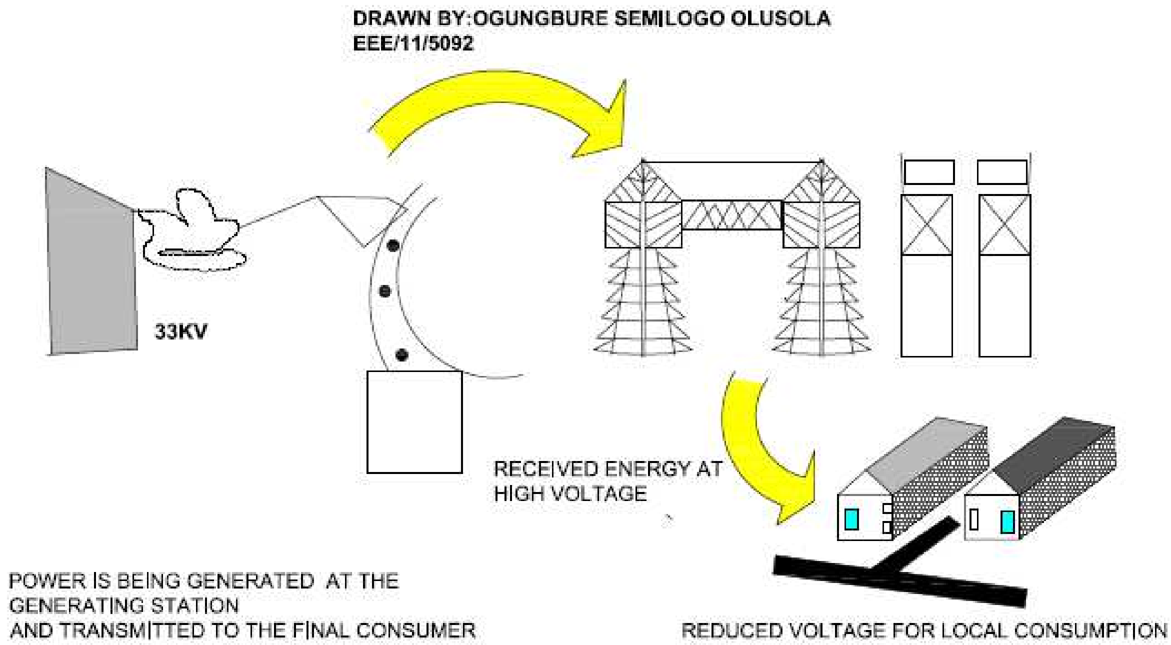
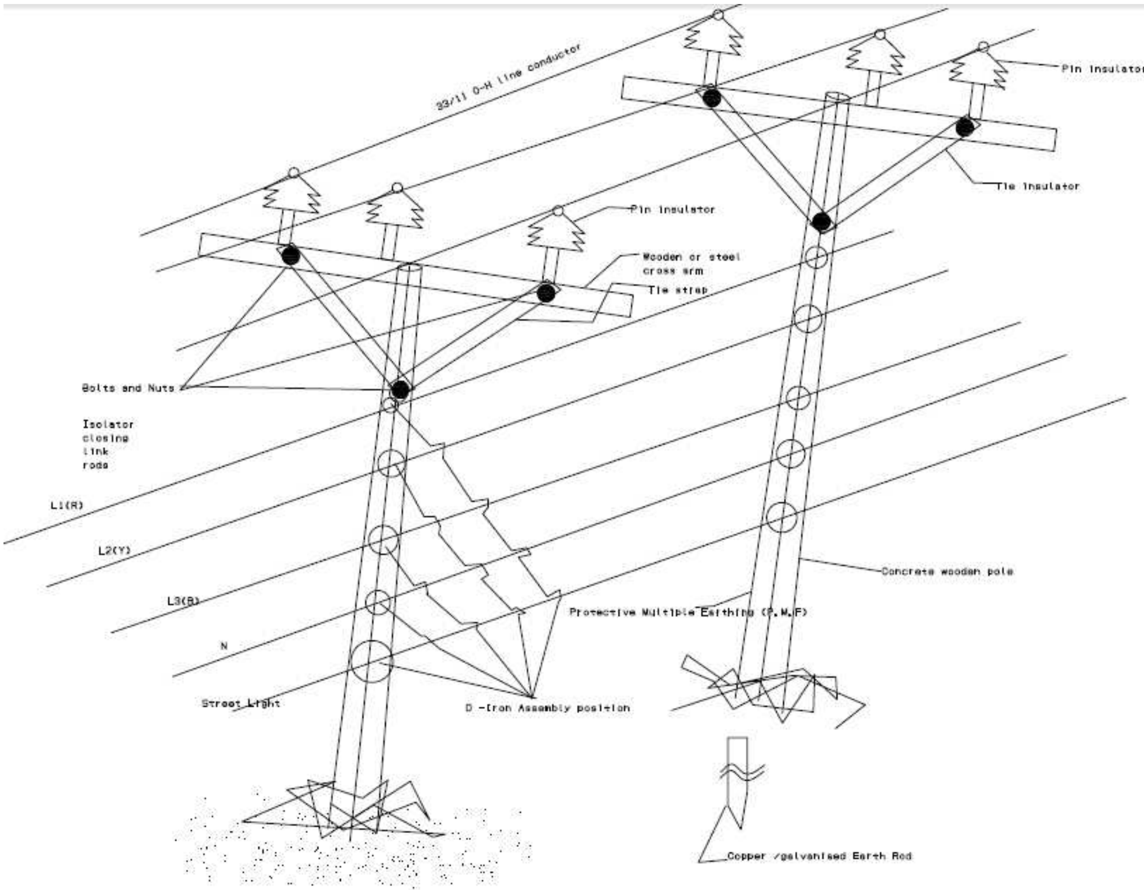
APPENDIX

Appendix 3: Sequence of power generation , transmission and distribution



Appendix 2:A typical dual construction for 33/11kv O-H lines on the same pole



Typical dual constructions for 33/11KV O-H lines on the same pole(for this type of construction adequate safety distance must be observed)