



DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

RAISING A TELECOMMUNICATION LINE POLE (TLP)

Prepared by:

MUHAMMAD AMIN BIN AHMAD FAUZI

2019209248

**DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)**

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It is recommended that the report of this practical training provided

By

Muhammad Amin Bin Ahmad Fauzi

2019209248

entitled

Raising A Telecommunication Line Pole

accepted in partial fulfilment of requirement for obtaining Diploma in Building

Report Supervisor : _____
Wan Nordiana binti Wan Ali

Practical Training Coordinator : _____
Dr. Nor Asma Hafizah Binti Hadzaman

Programme Coordinator : _____
Dr. Nor Asma Hafizah Hadzaman

DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at AKZ Resource Sdn. Bhd. for duration of 20 weeks starting from 23 August 2021 and ended on 7 January 2022. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfilment of the requirements for obtaining the Diploma in Building.

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Name : MUHAMMAD AMIN BIN AHMAD FAUZI

UiTM ID No : 2019209248

Date : 10 JANUARY 2022

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ABSTRACT

Telecommunication poles are vital to perform communication on a daily basis. Therefore, this report will discuss how to install the poles from the beginning until the work is finished. This project was done at Pantai Hospital Klang, Port Klang, Selangor and fully supplied by DiGi telecommunication operator. The objectives of this report are mainly to understand the installation process of the telecommunication poles, boom and antenna while identifying all the machinery and tools used in the process. Other than that, this report will also state the problems that might occur during the process and how to solve them. There are three ways of collecting data in this report, namely by observation, interviewing with the person in charge and reading several documents to ensure all the data collected is prompted and can benefit others in the future.

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CHAPTER 1

1.0 PREFACE

1.1 Introduction

An article from <https://www.un.org> (n.d.) describes about a developed country in the world telecommunication industrial and construction industry is one of the indicators for well developed countries like the United Kingdom, China, Japan and South Korea. Today, Malaysia is listed as a developing country as well as Singapore, Philippines, Indonesia, India and the list goes on.

Telecommunication and construction industry are very linkable to each other. Telecommunication network is a network of nodes, links, trunks and telephone switches that are connected, operated by telephone companies and used for data communication among the users. The telecommunication network can also include Internet, microwave and wireless equipment. The nodes are connected by transmission links and use the circuit switching, message switching or packet switching to pass the signal to the terminals that have unique addresses. Modern telecommunication networks connect the user to one of the nodes and each link is called a communication channel that can be wired, fibre optic cable and radio waves.

The examples of the telecommunication networks are telephone networks, Internet, computer networks, wide area networks (WAN), local area networks (LAN), virtual private networks (VPN), metropolitan area networks (MAN) and many more (<https://www.conceptdraw.com/How-To-Guide/telecommunication-networks>).

Amit Dua, (2021) stated that the telecommunication industry is game-changing to this modern world. Every telco company needs to stay up to date to meet the users' requirements and needs. Therefore, telco has introduced the 4g and 5g Internet networks to support nowadays needs.

While in the telecommunication industry, a telco company will install telecommunication poles at specific places to transmit their data to their user. As for today, Internet connection plays an important role in our daily routine since everyone needs the Internet to perform their jobs and tasks. For example, children in school have to adapt to this new trend of learning in Malaysia which is called Pembelajaran dan Pengajaran daripada Rumah (PdPR) using several mediums largely used like Google Meet and YouTube. Tertiary level students like university and college students are also facing this new trend although they have already learnt to do online learning since before the Covid-19 pandemic. As for adults, they need to submit reports, attend meetings and many more using the Internet. Thus, the Internet is such a mandatory need in this modern world.

Johan Maritz, (2004) describe about advantages from telecommunication such as telework. Telework describes a situation in which an employee is working anywhere but his or her traditional office is somewhere else. Next, Robert W. Lucky, (2006) said another advantage from telecommunication as example telecommunication also provides a technological foundation for societal communications.

1.2 Objectives

There are several objectives focussed in this project.

- I. To understand how to install the Telecommunication Line Pole, Boom and Antenna;
- II. To identify the machinery and tools used for installing the Telecommunication Line Pole;
- III. To analyse the problems that might occur during the installation work of the Telecommunication Pole and how to solve them.

1.3 Scope of Study

The scope of study or the limitation in this project is only focussing on how to install the telecommunication poles, boom and antenna. Next, this study is also focusing on the machinery and the tools used in the project and analysing the problems that might occur during the work, and come out with the solutions and only focussing on the work done at Pantai Hospital Klang, 41200 Klang, Selangor.

1.4 Method of Study

To gather information and data for this report, two methods of study are used which are primary method and secondary method. Gratton and Jones, 2010 stated that research that has involved the collection of original data specific to a particular research project is called the primary method (<https://research.com/research/primary-research-vs-secondary-research>). This means that the researcher gathers information first handed rather than relying on other data and information available elsewhere. Secondary method on the hand is the data and information collected from many sources and databases that have been analysed and synthesised.

1.4.1 Primary Method

Two primary methods were used in this report; observation and interviews.

I. Observation

This method is carried out directly by visiting the site. This method is also supported by using a camera. The camera is used to take images at the project site to provide information about the project, such as photos of the installation progress and the machines and tools used.

II. Interviews

I interviewed my site manager, Encik Abdullah and my site supervisor, Encik Mursidi to note the details of the project.

1.4.2 Secondary Method

Secondary information and data are collected by reading materials, documents and other relevant written materials. For this report, the data and information are collected from several office official documents and through the Internet. Drawing materials are also one of the sources of data and information used in this project.

I. Documents

The documents refer to written materials prepared by office staff stating data and information regarding the project. In this case, the documents were prepared by Puan Norliza and Puan Maz Zatil Adila, then verified by Encik Abdullah himself before submitting them to the person in charge of DiGi telco.

CHAPTER 2

2.0 COMPANY BACKGROUND

2.1 Introduction

AKZ Resource Sdn. Bhd. is a construction company with diversities of portfolio in different sectors. The company motto is “We Innovate Potential” and offers services to help customers build the infrastructure, building and industry from inception to reality. Telecommunication infrastructure is the company's main project. This company is always concerned about environmental and technological awareness to secure a safe and healthy place.

The company was established by Encik Abdullah bin Ridzuan himself with his brother, Encik Ridzal bin Ridzuan. Some friends that are also involved are Encik Sabri bin Nong and Encik Anwar bin Fikri, majoring in Research and Development (R&D) and designing respectively.

2.2 Company Profile

Company Name	: AKZ RESOURCE SDN BHD
Registration Address	: Lot 2087, Jalan Mahkota 1, Bandar Seri Putra, Bangi, 43000 Kajang
Co Registration No	: 939055 – X
Phone No	: 03 – 7624 8040
Fax No	: 03 – 7652 2868
Email	: hq@akzresource.com
Web	: https://www.akzresources.com
Office address (HQ)	: D-01-01, Menara Mitraland, No. 13A, Jalan PJU 5/1, Kota Damansara, 47810, Petaling Jaya, Selangor.
Office Address (Yard)	: Lot 2087, Jalan Mahkota 1, Bandar Seri Putra, Bangi, 43000 Kajang.
Board of Directors	: Anwar Fikri Bin Abdullah Mohd Hanafi Bin Ramlee Abdul Rahman Bin Mohd Sabri
Share Holder	: Anwar Fikri Bin Abdullah Abdul Rahman Bin Mohd Sabri
Bank	: Bank Muamalat Malaysia Berhad

2.3 Organisation Chart

AKZ RESOURCE SDN. BHD

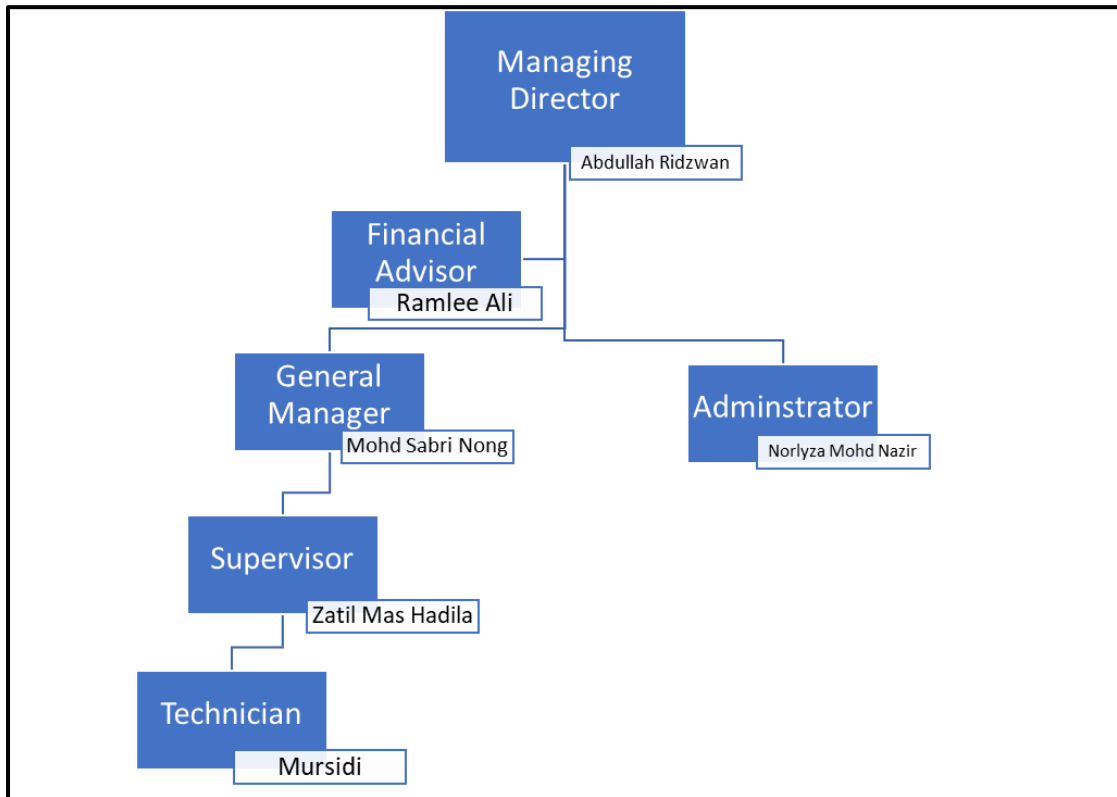


Figure 2.3 Organization Chart

2.4 List of Project

2.4.1 Completed projects

These are some of the projects done by the AKZ Resource company. Note that all listed projects below are the project to install TLP.

Location Project	Distributor	Date
Jalan Wan Kadir, TTDI KL	Celcom	30 May 2018
Jalan Mayang Sari Kuala Lumpur	Digi	11 Jun 2018
Jalan Mesra Ria	Celcom	11 July 2018
Jalan Sentul Pasar	Celcom	26 Nov 2018
Jalan 4/125 Petaling	Celcom	6 Dec 2018
Jalan 1/76 Desa Pandan	Maxis	16 Aug 2019
Menara Up Jalan Puchong	Webe	2 July 2020
Jalan Tun Ismail	Celcom	9 Nov 2020

Table 2.4.1 Table of completed installing TLP

Source: AKZ Company Document

As stated before, the company's main project is about installing TLP from a telco company. Here are some of the pictures of the work done.

I. Main work – TLP and Cabinet Installation;



Photo 2.4.1 TLP and Cabinet Installation at Jalan Bukit Setiawangsa

Source: Abdullah bin Ridzwan



Photo 2.4.2 TLP and Cabinet Installation at Taman Melewar Batu Caves

Source: Abdullah bin Ridzwan

II. Sub work – Renovation and Construction

This company also have sub work that been doing beside of raising a telecommunication pole. These are some of the work.



Photo 2.4.3 Construction of Mussola at SMK Desa Cempaka

Source: Mursidi bin Wakiman



Photo 2.4.4 Painting of Client House at Kota Seriemas

Source: Mursidi bin Wakiman

2.4.2 Project in progress

There are several projects waiting to be completed by the company. One of them is to propose to install cabinet at Jalan Helang Belalang at 15-11-2021 by TNB Sdn Bhd.



Photo 2.4.5 Left View Of site Project Jalan Helang Belalang Bukit Kepong

Source: Abdullah (2021)

CHAPTER 3

3.0 CASE STUDY

3.1 Introduction

This report is focussing on how to raise a telecommunication line pole (TLP) and the items needed to raise the TLP. There are many types and sizes of TLP such as 18 metres, 22 metre, 28 metre, with or without streetlight or using solar system energy. In this project, the 22 metre TLP was used with the streetlight attached on and using the solar system energy for DiGi telco company.

3.2 Project Background

As stated earlier in this report, the project of raising and installing the TLP was held at Pantai Hospital, Klang. There are several parties that are directly involved and responsible for this project. Those persons are Encik Abdullah himself as the company representative, and Encik Adib bin Sazali from DiGi as the client. Also participating in the project was Encik Rahman bin Muda as the owner of the site and Cik Ila Amalyn binti Saufi as the architect for the project.

3.3 Case Study

3.3.1 Installing the TLP

3.3.1.1 Site visit

Firstly, a method to raise a telecommunication pole is site visit. Site visit is only made a week or a day before the date to raise the TLP to review the site place and it's done by the main con or supervisor. The purpose of site visit is to know the exact location that proposed to raise the TLP and the in or out way to site place. This will help the work done more easily when the time of rising the TLP is on, by knowing what type of lorries, crane and backhoe to go to the site. In this project the site visit was done by the main con Encik Abdullah 4 day before the main project started. The purpose of this project site visit is to know the exact location of the site and the best way to go in and out for big transportation to be used because to get to the site it is using a small road only. Encik Abdullah also reviewed the place at site to put sand and pebbles for the project.



Photo 3.3.1 Site area for site visit, Port Klang, Selangor

3.3.1.2 Excavate soil and levelling

Before the excavation work, the area that needs to excavate must be ensured and must not have any grounding wire or pipe there. In this project the shape of the base for TLP is square. The dimension of this base construction is 10' x 10'. The excavation depth is determined by the soil if the soil is hard so the excavation is only 1' depth, if the soil is soft the depth should be 3' or more depth. The excavation work is done with the use of a backhoe. The backhoe helps to excavate the soil for the base of TLP much easier and faster than doing by hand. It will also help the worker save their energy for other work that can't be done by machine. After the soil is excavated the surface of the excavated area must cover with pebbles or rocks to absorb the impact. This work also can be done by using a backhoe for faster and easier.



Photo 3.3.2 Excavate the soil using backhoe, Port Klang, Selangor



Photo 3.3.3 Cover the excavated area with pebbles Port Klang, Selangor

3.3.1.3 Installing TLP base

After the excavation and cover the excavated are completed, the work of installing the TLP base can be done. Installing the base requires a mini crane machine to help to take from the lorry and to put on the covered excavated area. The base comes in pieces and needs to be combined by a nut and it needs to be measured by a leveller because it needs to level all sides. It takes more than 5 workers to help with installing the base because it needs to be level and the base pieces are so heavy. After the bases are combined and already level all the sides, it needs to be filled with the pebbles to take the impact and also to reduce lightning shock to the surrounding area. But when filling with the pebbles, the middle one and the side that is used for grounding cannot be fully filled. It will be filled later after the grounding works are done. Then after being filled with the pebbles, the top will be covered by sand to make it look better and make it easier for workers to move around because pebbles don't have surfaces and when covered with sand it needs to be compacted and level with all sides. This work is done by hand and not using machines because I don't want to make the base moving or not levelled again.

In addition, the middle base hole will be installed with a nut. This purpose is when installing the pole, the bottom pole has hole that will only fit with these nuts for make the pole and base are combined and make the pole not moves.



Photo 3.3.4 Installing the TLP base



Photo 3.3.5 Filling the base with pebbles



Photo 3.3.6 Cover the surface with sands



Photo 3.3.7 Installing nuts in middle base for TLP



Photo 3.3.8 check the level with leveller

3.3.1.4 Installing electrical box and TNB metre box and wiring the cabinet

After the base work, the electrical and metre box will be installed and then TNB workers will come to install 1 grounding pole and to bypass the electric energy from the near street light. Before the bypass, the electrical system box and TNB metre box and the grounding wiring must be connected first. This is for safety. This purpose is to give electricity to the telecommunication line pole. The grounding pole is installed far from houses and TLP because the overcurrent will go to the grounding pole and be absorbed to the ground. This is to prevent any casualties either for pedestrians or providers.

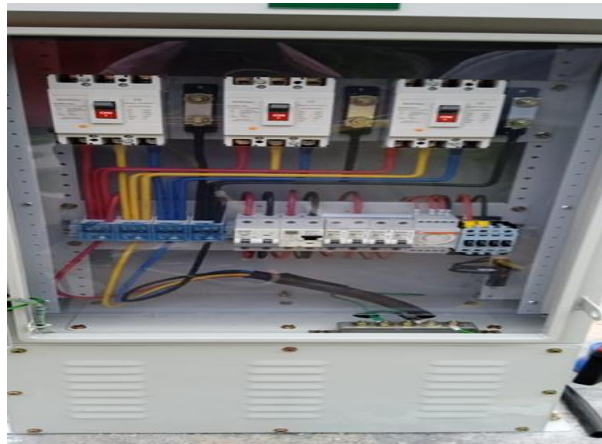


Photo 3.3.9 Installing the electrical system box



Photo 3.3.10 Installing the TNB metre box



Photo 3.3.11 TNB worker installing grounding pole and bypass the electricity from street light

3.3.1.5 Combine the pole and install boom and street light

After that the wiring is done, the pole can be combined and the boom for the antenna can be installed in the pole. The telecommunication pole is come with 3 pieces, the bottom one that have hole to be installed at the base with the nut that have be done installed previous work, the middle one for the street light if the provider gives the telecommunication pole with street light, and the top that where the boom and solar system to be installed. The pole has 6 slots for boom, that means the provider can rent to 5 other telecommunication providers to use the pole to install their line there. The slot for boom is standard to have 6 slots. And at the top of the pole there is a slot to install the solar system for street lights. In the middle piece there are 2 slots for street lights to be installed. If the provider provides the street light, it needs to be installed in this stage because it will be easier for the worker than doing after the pole is raised. The combination will need to use a big crane and 10 tan sling belts to combine it. Install it by putting the top inside the middle and middle inside the bottom and then screw the nuts.

The street light would be wiring and be tested before installed to the pole and need to take a picture with the light on. This is to give the proof that the light is in good condition and if the light is broken it needs to be changed to the new one before installing. The picture is sent to the provider as a proof.



Photo 3.3.12 Wiring the street light



Photo 3.3.13 Testing Street light



Photo 3.3.14 Combining the 3 pieces pole



Photo 3.3.15 Installing the boom the boom slot



Photo 3.3.16 Installed Street light to pole

3.3.1.6 Raising the pole

After installing a boom, street light and combining the pole, it's time to raise it up. This work would be using a big crane and 50 tan sling belts. The belt is tied to the middle pole and the bottom pole to make it stand up. The crane would be lifting it up slowly while the worker will help it to stand up and it must be stable or else the pole could drop off. So, this work must be done carefully and slowly to avoid unnecessary accidents. After the pole is standing straight the crane will lift it up more to move the pole to its base. And after the pole is above the base the crane would slowly lower the height and the worker will help it to put the pole on its designed slot. The worker then needs to use a leveller again to check if the pole is level on each side or not. Then its bottom poll will screw by nut to the basement. The crane still cannot drop off the pole because they don't want the pole to fall off and hurt the worker. Until all the nuts are screwed, the pole cannot be dropped by the crane. After all the screwed nut work is done then the crane can slowly lower the height and the worker will climb the stairs to open up the tie from the pole.

When to check the level of the sides the pole, need to make sure the bottom of pole doesn't have anything and if the level is not same, need to put some washer on the lower side to make it level.



Photo 3.3.17 Tie the sling belt to pole



Photo 3.3.18 Help to stand the pole



Photo 3.3.19 Help the crane to put pole in its slot



Photo 3.3.20 Check the level of each side



Photo 3.3.21 Screwed the nut from base to bottom pole

3.3.1.7 Wiring

After the crane drops off the pole, it's time to wiring. There are 3 sites for wiring, top for the boom and middle for street lights and for grounding. The top and middle wiring will be using a crane to help the worker get to that height easily and safely. If using the stairs, it's so dangerous due to the energy used for climbing and the need to hold the body using a safety harness. The wiring process needs to wear hand gloves for safety. At the ground wiring there are 2 wiring types. Wiring the life and current from the electrical box to the pole and wiring the grounding wire from box to ground. The ground wiring set is a grounding rod and grounding box set. First, I need to hammer down the grounding rod to the inside lowest ground until it can't be hammered more. Cut the surplus rod with a cordless grinder. Then use a grounding box set to seal the copper wire within the grounding rod. The grounding rod will be installed at each corner of the base site so it has 4 grounding rods. After the wiring work is done, I need to check the grounding electricity with an electricity metre.



Photo 3.3.22 Wiring at top TLP for boom



Photo 3.3.23 Wiring at bottom for electric box



Photo 3.3.24 Seal copper grounding wire to grounding rod using Grounding Box set



Photo 3.3.25 Check the grounding electricity

3.3.1.8 Install fences and cleaning the site

After all work is done, we need to make the site look tidier than before and need to provide safety for wire and electricity from the site. So, installing fences will make it look tidier and put up more safety to the site. After completion the fences need to be cleaned up and filled up with extra sands to fill in any hole or unfilled hole. After the inside is done, I need to cover the outside site to put all the pebbles and sands surrounding the site to look more clean and more beautiful. The reason for putting sands and pebbles surrounding the site is to hide all the copper wire from grounding. Because copper is often getting stolen.



Photo 3.3.26 Installing the fences



Photo 3.3.27 Cleaning up the site and fill the surrounding with sands and pebbles

3.3.1.9 Testing and commissioning

After completing all of the work from the start to installing fences and cleaning the site, it's time to test the street light and the electricity on the site. Then I need to take a picture and send it to the provider as proof the site project is done.



Photo 3.3.28 Completed Telecommunication Pole

3.3.2 Machinery and Tools used for the Project

Telecommunication Line Pole (TLP) installation requires various machinery and tools. These are the machineries and tools use:

3.3.2.1 Machinery

I. Backhoe

Backhoe is a construction tool that is used for digging and excavating. Backhoes are similar to excavators, but they are smaller and have more versatility as a result of their lower size. Backhoes are cheaper than excavators and may be driven on roads. As a result, a backhoe is preferable than an excavator for TLP installation because TLP does not require a large amount of area.



Photo 3.3.29 Backhoe machine

II. Lorry crane

Lorry crane is a simple lorry equipped with a small crane that can assist in the transportation of heavy parts or objects from lorry to site or from site to lorry. Lorries can be used to transport large quantities of goods or items of a large size from a warehouse to a work site. Lorries with cranes are a little more expensive than basic lorries due to the crane's use, but they can save workers time and energy when transferring items from the lorry to the job site.



Photo 3.3.30 Lorry crane

III. Crane

The crane is used in TLP installation to combine the three body parts of the pole and to stand it up and move it. The pole cannot be installed using simply worker energy due to its large weight. The crane must be applied to support.



Photo 3.3.31 Crane

3.3.2.2 Tools:

I. Full set of spanners

Because the TLP base uses nuts and bolts, the spanner is the most necessary tool in TLP construction. This spanner must also be used on the electrical cabinet and the TNB box.



Photo 3.3.32 Full set of spanners

II. Cordless drill

Drilling is also crucial in every construction project, including TLP installation. The term "cordless drill" refers to a drill that is powered by a battery. Because there isn't a plug at the job site, the cordless version will be ideal.



Photo 3.3.33 Cordless drill

III. Cordless grinder

The grinder is usually used in the wiring and installation of fences. Normally, a grinder is used to cut steel in construction operations. Grinders are used in the TLP installation process to cut copper wire and thick wire covers. Also, because fences are made of steel, a grinder must be used to cut any unneeded steel when placing the fence. Cutting wires using a cutter is also possible, but it wastes a lot of energy for workers when dealing with thick wire covers.



Photo 3.3.34 Cordless Grinder

IV. Shovel

Shovels are commonly used in construction projects to dig holes or fill them with sand or other materials that are compatible with filling. During the TLP installation, a shovel is used to fill the base with sand and pebbles.



Photo 3.3.35 Shovel

3.3.3 Problems Encountered and Their Solutions

During doing the TLP Installation work there might be some problems. So, in this topic, it defines what problem might occur and the solution to handle the problem with ease.

Problems Encountered	Solution
<p>Raining Heavily</p> <p>It is extremely unsafe for workers to work when it is raining heavily. When exposed to high rain, the worker may slip or become ill. Short circuits might occur in the wiring project.</p>	<p>Check the weather the day before you start working, or delay the project to a day when the weather is great. Postpone the project until the rain is drizzling and lighter.</p>
<p>Wet and watery soil</p> <p>The task of digging the earth cannot be done when the ground is waterlogged. And it won't be possible to cover the land with sand until the water in the ground has drained.</p>	<p>Bring the water pump and use it to remove the water from the ground. The worker can alternatively use a cement bucket to remove water.</p>
<p>Site have tree or garbage on site project</p> <p>When there is garbage and trees on the project site, it is difficult to complete the job due to a lack of space and the possibility that the project will be disrupted.</p>	<p>Cut the trees using chainsaw a week before the project and using a backhoe to take the garbage and put it in the roro.</p>

Table 3.3.1 Problem encountered and solution

CHAPTER 4

4.0 CONCLUSION AND RECOMMENDATION

To conclude this report, raising and installing a Telecommunication Line Pole (TLP) and Cabinets requires a lot of machines and tools and facing risky unexpected problems. And for this reason, this project must be handled with people that are mentally and physically well prepared. This project is in need of much hard work since all the equipment needed is heavy load. So, to adjust this situation, I have come up with several ideas like changing the 4g TLP pole to 5g TLP pole as it is cheaper and the raising and installation time is not too time consuming compared to a 4g TLP. The future is very demanding of using internet, so because the difference speed for 4g and 5g are very different, hope the old generation will accept the concept of 5g.

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