UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

SEPTEMBER 2014

It is recommended that the report of this training provided

By

NIK NASRAN BIN NIK LAH

2012835932

entitled

METHOD INSTALLATION OF AIR CONDITIONING USING SPLIT UNIT AND CASSETTE UNIT

accepted in partial fulfillment of requirement has for obtaining Diploma in Building.

Report supervisor	Pn. Suryani Binti Ahmad
Practical Training Coordinator	Pn. Wan Nordiana Bt Wan Ali
Faculty Coordinator	Dr. Mohd Rofzi Bin Abdullah

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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 Aspirasi Viana development for duration of 5 months starting from 12 May and ended 29 September 2014. It is submitted as one of the prerequisite requirements of DBN307 and accepted as partial fulfillment of the requirements for obtaining the Diploma in Building.

Name : NIK NASRAN BIN NIK LAH

UiTM I.D No : 2012835932

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Thank you very much

ABSTRACT

This report describes the method installation of air conditioning using split unit and cassette unit. This report is produced based on the experience of five months at the site in the course of practical training. This report is divided into a few parts of installation procedure. This is because the air-conditioning involves step by steps when doing the installer and should be done carefully. Step of installation will be observation, surveying and research from the worker. During the observation, the installation of air conditioning is not as simple as envisioned. Furthermore, to explain more about the method was used to process installer of air conditioning system. During the process of installation of air conditioning system has various components and equipment of installation can be identified. This report will describe in detail about the function of air conditioning system type split unit and cassette unit. This report will finalize entering some suggestions that may help in dealing with this problem.

LIST OF FIGURES

LIST OF TABLES

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LIST OF ABBREVIATIONS

M&E	Mechanical & Engineering
DME	Daya Maju Enterprise
W.C.Y	Wakaf Che Yeh
UiTM	University Teknologi MARA

CHAPTER 1

INTRODUCTION

1.1 Introduction

Air conditioning type of split unit and cassette unit has a few difference ships characteristic but they have same functioning is a system for controlling the humidity, ventilation, and temperature in a building. Typically to maintain a cool atmosphere in warm conditions air-conditioning have many type will be using in the building for controlling humidity, ventilation and temperature as air is the only media that encompasses the whole of our body, need to condition this air to provide comfort (Kay A 2003).

Function of air conditioning is to control temperature heating & cooling. This entails adding energy or removing unwanted energy. Control humidity is control moisture content in the air. Either humidity a add moisture when dry. This can result in dryness of skin, dry throat and encourage static build up or humidity remove moisture when the amount of moisture in air is high, which can result in breathing discomfort. Next, provide ventilation is to provide the necessary oxygen for breathing and dispelling carbon dioxide, odour, dust and smoke. Generally ventilation requirement range between 5-18 liters per second per person. Lastly, provide filtration mean is to clean outside and inside air by removing dust and pollen.

Dust in dry air combined with dryness is lack of moisture in the air that the main cause of static shocks. Lack of ventilation and filtration combined with the lack of maintenance is the main cause of sick building syndrome (Kay A 2003).

1.2 Objectives

The objective of this report is to study method installation using split unit and cassette unit.

1.3 Scope of study

Scope of study focus on method installation of air-conditioning split unit and cassette unit. Location of this project of apartment 14th floor is Wakaf Che Yeh this type of cassette unit only installs at hall and split unit installs at every room. Each room service provides one unit air-conditioning split unit while cassette unit will provide at the whole level ground floor. Installations air-conditioning will start with cassette unit at the ground floor. This level needs 9 unit cassette of air-conditioning system to controlling the humidity, ventilation, and temperature in this area. Next, for the installation split unit air-conditioning system will start install after finish installation cassette unit and will begin from level 1st floor until 12th floor.

1.4 Method of Study

1.4.1 Interview

The primary data was obtained from partners relevant. The construction progress was running so that it was an opportunity to learn something new and experienced by partners relevant such as engineer M&E and sub M&E.

1.4.2 Field Observation

At site, all the construction can be observe from time to time. A lot of input and knowledge can be getting after observation of the work on site. The observe process is very important for knowing the true and exactly process in reality world of construction. The primary data were written into log book and it can be referred from day by day or any information about construction from my supervisor.

1.4.3 References

All information on literature review has been collected through numerous sources such as books, internet and journals. These sources were valid to be used and information that closely related with the topic. The resources such as unlined theory, Journal and Books.

1.4.4 Internet

The easier method to get information about this study to use your internet technology is widespread today. This method is much easier and faster because all the information about to be searched easily search. A lot of information contained in the Internet because always updated. Sources believed to be well because experts who wrote it.

CHAPTER 2

COMPANY BACKGROUND

2.1 Introduction

Figure 2.1: Company Logo
Source: Aspirasi viana development Sdn. Bhd.

Name of company is Aspirasi Viana Development Sdn. Bhd. This company established on 16 July 2011. Aspirasi Viana Development Sdn Bhd is a Great Developer in building sustainable communities with a global presence. It is an integrated property player involved in property development, asset management, hospitality and leisure. Currently, Aspirasi Viana Development has a significant presence in the Malaysia region with projects Kelantan & around Countries. Aspirasi Viana Development is created through the integration of the property & currently involved in the development of some of the well-known townships/projects in the country of Kelantan for nowadays and in future. To achieve its vision as Malaysia's premier community developer, Aspirasi Viana Development seeks to combine the best of residential, commercial and retail concepts, whilst providing higher standards of convenience, security and quality to its customers.

Aspirasi Viana Development aims to record continuous growth in its returns, be recognized as a top brand by industry benchmarks and become the champion for sustainable practices in Housing Development, Properties & Construction Fields.

2.1.1 Vision

The company vision is to be a premier market leader in construction and property development in the local and international market known for its integrity, distinctive innovations, quality, and excellence in service.

2.1.2 Mission

Mission and desire is major companies want to join and support of governments related to the statutory in making plans (National Mission) to improve the key infrastructure facilities to people in addition also increase in nation.

2.1.3 Future Development

Since the Company started its operations, most of its business activities were confined within the state of Negeri Sembilan. Having gained ample experience and stability, the Company is now venturing into other business avenues elsewhere.

To meet its business objectives, the Company had injected a project development cell, solely to identify and develop feasible business opportunities for its expansions. To achieve this, the Company would be willing to foster joint ventures and co-operations with local and foreign entities as regards to sophisticated and specialized work for mutual benefits.

2.1.4 Quality Policy

Aspirasi Viana Development is committed to provide their customers quality products and services, while meeting the highest level of standards and performance in jobs. Aspirasi Viana Development strongly believe in quality and are committed to proper and systematic implementation of all work procedures and acknowledge that teamwork is a critical element for successful planning and implementation to ensure Quality - Effectiveness & Efficiency - Timely Delivery/Completion of all the projects and work is done right the first time. Aspirasi Viana Development shall comply with applicable statutory and regulatory requirements in the implementation of all projects.

Aspirasi Viana Development will manage effectively and efficiently all projects undertaken and will also monitor the performance of each project to ensure execution is strictly in line with safety, cost, standards, specifications and timelines specified. Aspirasi Viana Development will inculcate a continuous quality process improvement culture to satisfy all our customers and stakeholders expectations through periodic reviews to meet the objectives. Aspirasi Viana Development recognizes that environmental quality is of paramount importance to the community.

Aspirasi Viana Development will establish and implement standards and procedures to enhance the way buildings and communities are designed, built and operated, enabling an environmentally friendly and socially responsible, healthy, and prosperous environment that improves the quality of life and result in thriving neighborhoods.

2.2 Company Profile

Table 2.1 company profile

Name of Company	Aspirasi Viana Development Sdn Bhd
Address	Lot 267, Tingkat 1, Jalan Sultan Yahya Petra, Lundang, 15200, Kota Bharu, Kelantan.
Tel. No.	
Fax. No.	
Email	aspirasiviana@gmail.com
Web site	www.aspirasiviana.com
Started from	16 July 2011
Main Contractor	Mj Utama Bina Sdn Bhd
JUMLAH KONTRAK ASAL:	RM 18,750,000.00
Owners company	CHEW EE SUAN (chief executive officer) NIK HAZARULHISHAM (chief operation officer)

Source: Aspirasi Viana Development Sdn. Bhd.(2011)

2.3 Organization Chart

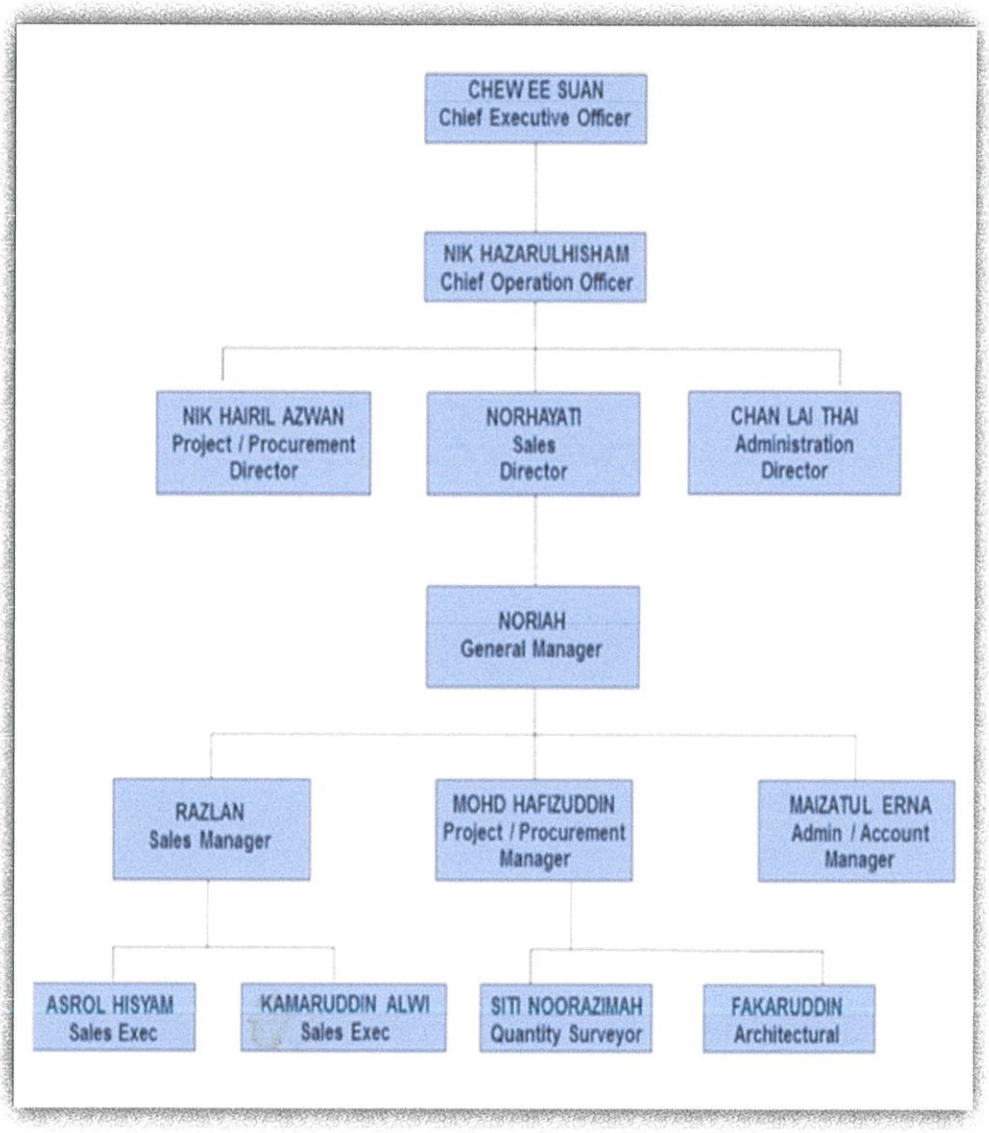


Figure 2.2 Company Organization Chart (2011).

2.4 List of Project

2.4.1 Project in Progress

Table 2.2 List in progress project

Year	Activity of Company
2012	MEMBINA DAN MENYIAPKAN SERVICE APARTMENT VIANA COURT 156 UNIT HOTEL APARTMENT 14 TINGKAT DI KOTA BHARU,KELANTAN.
2013	1) MEMBINA DAN MENYIAPKAN 2 UNIT RUMAH BANGLO 2 TINGKAT, JALAN GUCHIL BAYAM, KOTA BHARU, KELANTAN. 2) MEMBINA DAN MENYIAPKAN 2 UNIT RUMAH BERKEMBAR 1 TINGKAT, JALAN GUCHIL BAYAM,KOTA BHARU,KELANTAN.
2014	1) MEMBINA DAN MENYIAPKAN 17 UNIT KEDAI PEJABAT 3 TINGKAT DI DAERAH TUMPAT,KELANTAN. 2) MEMBINA DAN MENYIAPKAN 27 UNIT KEDAI PEJABAT 3 TINGKAT DAN 50 UNIT RUMAH TERES 2 TINGKAT, DI KULIM WAKAF BARU, KELANTAN.

2.4.2 Completed Project

Table 2.3 List of complete project

Year	Activity of Company
2010	MEMBINA DAN MENYIAPKAN SERVICE APARTMENT ANJUNG VISTA 21 TINGKAT DENGAN 251 UNIT PANGSAPURI DAN SATU UNIT LOT KOMERSIAL DUA TINGKAT DI KUBANG KERIAN,KELANTAN.

CHAPTER 3

CASE STUDY

3.1 Introduction

Air conditioning is the process of cooling the air in a building to provide a comfortable temperature. An air conditioner is the component in a forced-air air conditioning system that cools the air. A chiller is the component in a hydronic air conditioning system that cools water, which cools the air. An air conditioning system is the equipment that procedures a refrigeration effect and distributes cool air water to building spaces. Air conditioning systems are classified by evaporating medium, condensing medium, physical arrangement, and cooling capacity (Billy C. Langley 1931).

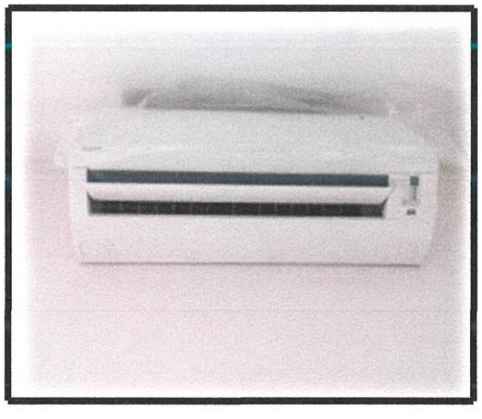


Photo 3.1 air-conditioning cassette unit

Photo 3.2 air-conditioning split unit

3.2 Project Background

The location of the construction site for this case study is located at lot 2992, Seksyen 62, Mukim Padang Enggang, Wakaf Che Yeh, jajahan Kota Bharu, Kelantan. This project is proposed to build service apartment Viana court 14 floor including 156 unit apartments, multipurpose hall, restaurant and parking space. This building required 155 splits units air-conditioning and 13 unit's cassette unit will install at ground floor. It is air-conditioning gives controlling the humidity, ventilation, and temperature in a building. In this chapter, it will explain about method installation of air-conditioning split unit and cassette unit.

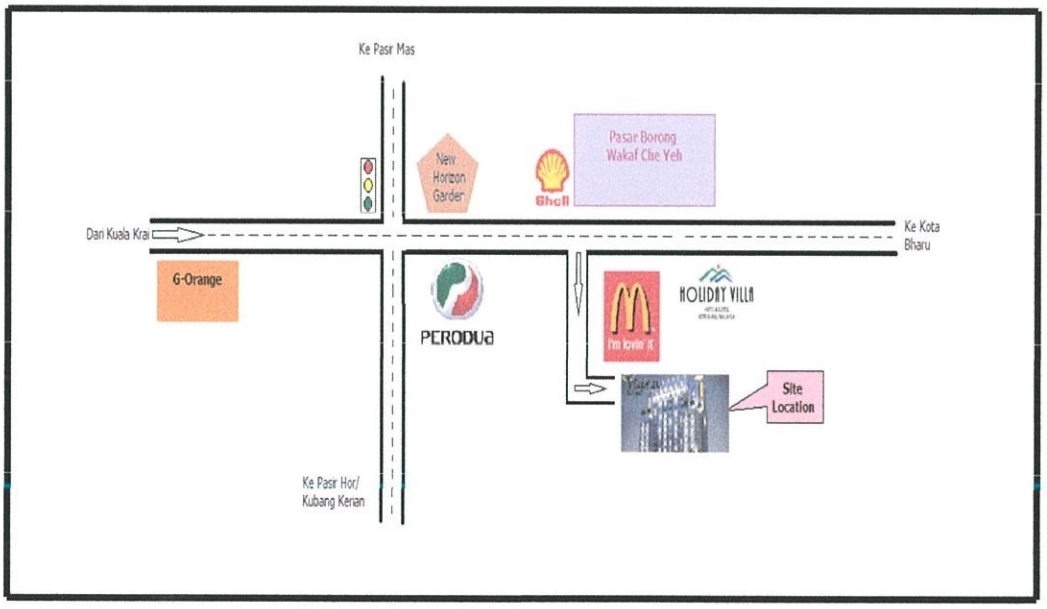


Photo 3.3 location of viana court

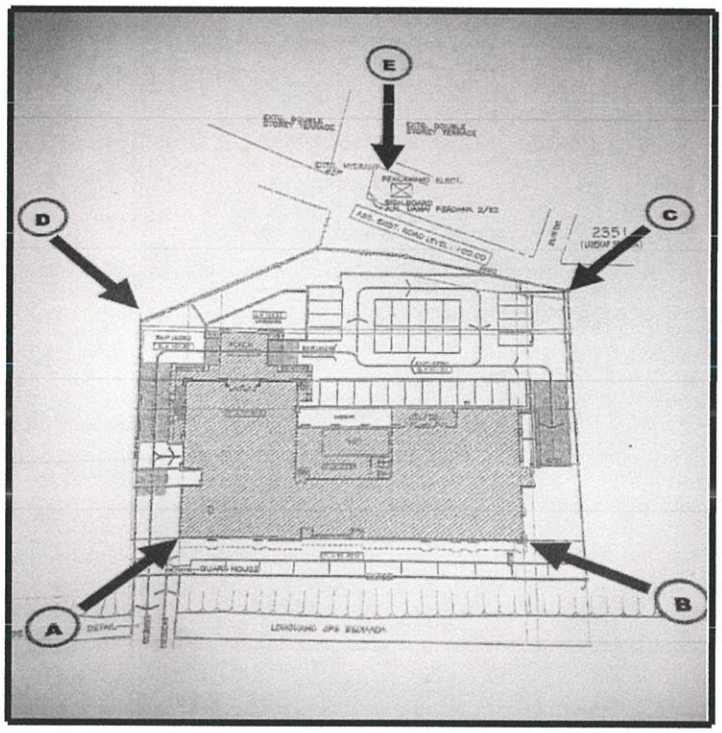


Photo 3.4 Detail of location plan

Photo 3.5 Site Viana Court

3.3 Case Study (Method installation air-conditioning)

3.3.1 Air-conditioning type of split unit

Air-conditioning of split unit system is extract the air from the air conditioned and combined it with the external air for ventilation purposes. Method installation split unit system will be mounted on the wall to provide cool air for the room. While for the compressor, it has to be installed near the outside of the building. Compressor will absorb hot air from outside to process cooling air. Split unit system start from 1st floor until 12th floor. Each room will provide only one unit air-conditioning system. Method installation for split unit is mounted at the wall. A split unit air conditioner provides for small room only (Khatib, 2014).

Split unit are commonly installed in homes with radiant panels, space heaters, and other heating system. They can suitable alternatives for small rooms like our practical apartment and additional rooms specifically if the ductwork installation is not possible. Sub-contractor for this installation air-conditioning split unit are from company ZNZ enterprise. The worker from ZNZ will install all type of split unit in each room service (Khatib, 2014).

3.3.1.1 Method 1- AIR-CONDITIONG SPLIT UNIT INDOOR

Step 1

Photo 3.6 split unit indoor

Air-conditioning type of split unit suitable install at small room. First of all method installation split unit is split unit indoor must select the suitable location without unobstructed on interior wall to mount the indoor air conditioning unit. Next, split unit indoor must be installation far away from any antenna, power or connecting lines such as television, radio, telephones and etc. split unit indoor must far away at least 1 meter. However, before the split unit indoor mount at wall the worker must ensure that wall should be strong enough to hold the load and weight of split unit indoor. Usually split unit indoor installed at the top of wall difference with split unit outdoor installed at the bottom wall.

Step 3

Photo 3.8 hole at wall

Method installation air-conditioning for step 3 is the worker must create a hole in the wall to include and fit the piping. Firstly, the worker must find the base area to create a hole connect to exterior base on the opening in the mounting bracket. Before drill the hole at wall the worker must choose area near with length of the pipe and the distance that it needs to travel to reach the outside unit. After choosing that area the worker should be drill a hole through the wall. The hole should slope downward toward the exterior to ensure adequate drainage. Lastly, the worker should be inserting a flexible flange into the hole.

Step 4

Photo 3.9 included pipe in the wall

Method installation air-conditioning split unit indoor for step 4 is connection the pipes. The first of worker must to do is run the piping from the indoor unit toward the hole drilled through the wall. Make sure minimize bending to ensure that unit can be flow performs as well. Next, the worker must cut a length of PVC pipe interior and exterior wall surface. Insert the pipe into the hole in the wall. After that, the worker should bind the cooper pipes, the power cables and the drain pipe together with electrical tape. However, the pipe outlet must place outside at the bottom to ensure water can flow outlet. Secure the pipe to the indoor unit and join the water drainage pipe to the indoor unit's base. The worker must ensure that the drainage pipe allows water to drain in a suitable place. Machine hacking will be used to hack the wall for included the pipe outlet and cooper pipe together. Lastly, the worker must be plastering the wall with plaster to close the hole of pipe.

Step 5

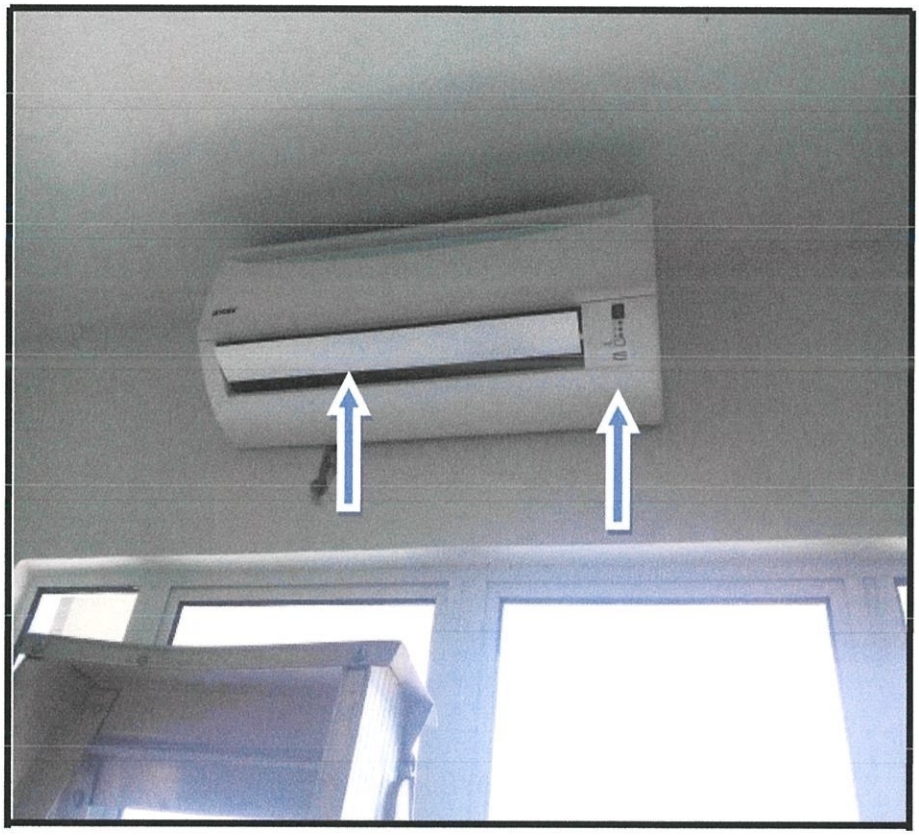


Photo 3.10 mounting split unit

Method installation air-conditioning split unit indoor for the step 5 is securing the split unit indoor to the adhesion near the plate that was screw. First of all the worker should be ensure the split unit indoor must be neat installation mounting plate to avoid from falling down. If the worker not installs perfectly the split unit indoor may falling down at the wall that cause can be damage. Besides that, the worker also must ensure the connection between cooper pipe and pipe outlet can connect with split unit.

Step 6

Photo 3.11 connection wire

Final method installation air-conditioning split unit indoor is the worker should be checking the electrical connections to ensure that power electric can be used to split unit power. Firstly, 1 worker must lift the split unit indoor front panel and remove the cover. Besides that, the worker also must ensure the cable wires are connected to the screw terminals. Next, the worker must match the diagram that comes with the split unit. After installation wire the cover must be close to testing air-conditioning.

3.3.1.2 Method 2 – Install the Outdoor Condenser of split unit

Step 1

Photo 3.12 place of condenser

The first of method installation air-conditioning split unit outdoor. Split unit outdoor is called condenser. These methods have a few differences with split unit indoor. Split unit outdoor must be install at outside of room to provide the air. First, the worker must choose the suitable place to install the outdoor unit. The choosing place must be considered to choose near with the cooper pipe. Next the outdoor unit needs space to be away from any dusty or hot areas. Before that, the worker must endure that space is enough to proper functioning outdoor unit.

Step 2

Photo 3.13 condenser unit

Method installation air-conditioning outdoor unit for step 2 is connecting power electrical wires with condenser unit. First of all the worker must remove the condenser cover to easier the worker to connection wiring. Before that, the worker should be refer to the units wiring diagram and make sure the cable are connected as the diagram suggests. Next, the workers connect the cable wires to the screw terminals at condenser. Make sure cooper pipe also must connect together with wiring.

Step 3

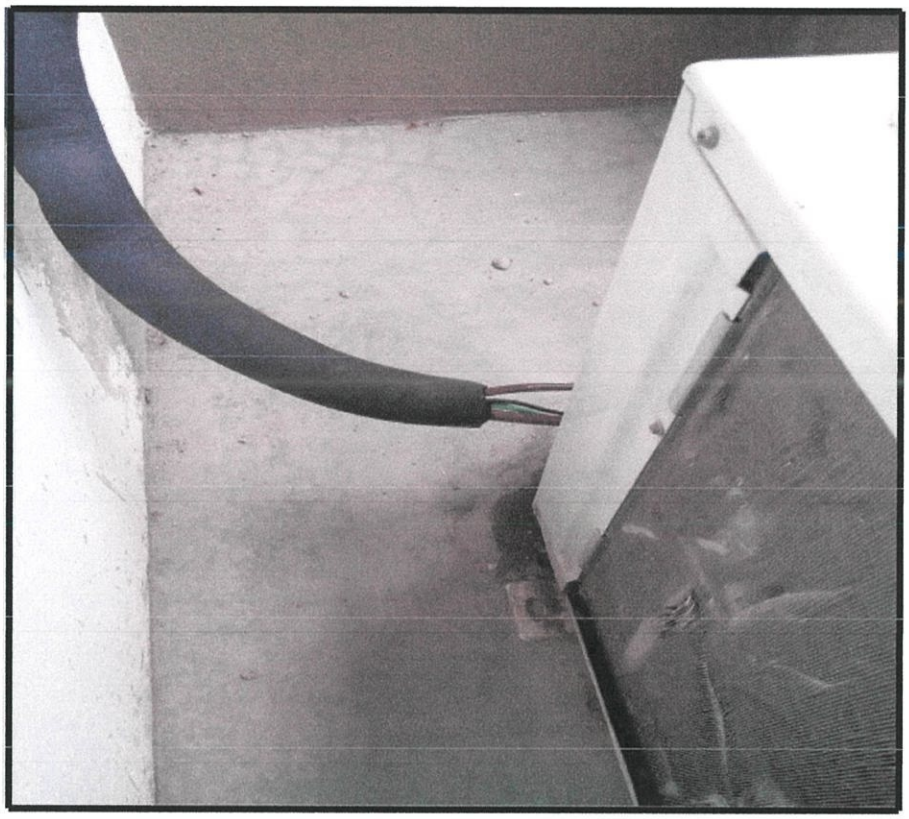


Photo 3.14 connection cooper pipe

Method installation air-conditioning condenser unit for step 3 is secure the pipe nuts to the suitable pipes on the outdoor unit and bleed the air and humidity from the refrigerant circuit. Connect a vacuum pump hose to the service port. Close the low pressure knob and then turn off the vacuum. Test all of the valves and joints for leaks. Disconnect the vacuum. Replace the service port and caps.

Step 4

Photo 3.15 touch up hole

Method installation air-conditioning condenser for step 4 is plaster the hole of wall was create by the worker to included pipe. Firstly, the worker must close and clamps the hole in the wall with using concrete mix. After that, the closer hole at wall should be skin coat to look nice.

3.3.2 Air-conditioning type of cassette unit

The cassette units are extremely discreet with only the grille showing in the ceiling. Air can be delivered in up to four directions, giving the room an even temperature distribution. A highly efficient fan design, its wide airflow distribution ensures even temperature distribution. Cassette units are easy to clean and maintain. Difference of cassette and split unit is cassette unit more difficulty than split unit. However, cassette unit will be mounted at the ceiling. Cassette unit install only at ground floor and need 13 cassette unit to install at ground floor including the hall (zulkiflee, 2014).

The cassette unit very low noise output Ceiling cassette units are extremely quite when in use this goes for both the indoor & outdoor units. Besides that, the cooled or heated air can be distributed evenly or in a specific direction giving the user lots of control. Sub Con for this project installation air-conditioning cassette unit is from company DME. The worker from DME will install all type of cassette unit at ground floor included in hall of this apartment service (Zulkiflee, 2014).

3.3.2.1 Method installation air-conditioning type of cassette unit

STEP 1

Photo 3.16 marking size

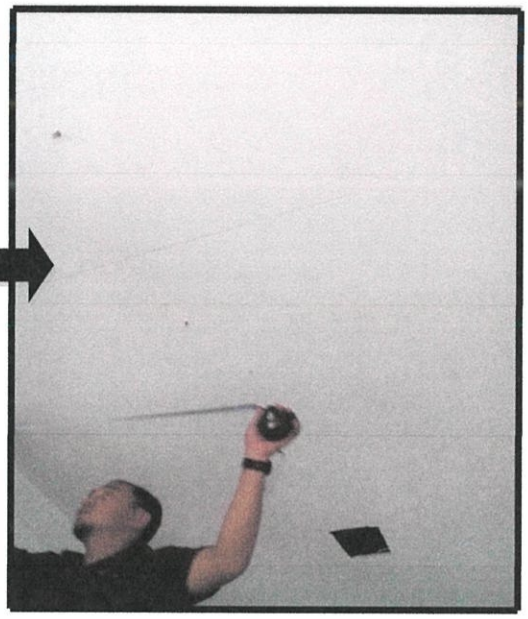


Photo 3.17 measurement size air-cond

Method installation air-conditioning cassette unit is more difficult to install because they mounted at the top of ceiling. Method installation of cassette unit for first step is creating mark of air-conditioning. The worker must make a Hole at the top of ceiling to include cassette unit. Before that, the worker must create a mark of size cassette to easier cut out the ceiling. Size of cassette unit is 130mm x 1300mm so, that size will be mark at the ceiling to remove ceiling cut. Before that, the middle of cassette unit will be marking to easier the worker to create a size. Measuring tape will be used to measure the size of cassette unit. cut box will be using to remark size of cassette unit before cutting ceiling. For the purpose of remark size is used to avoid from mistaken position of cassette unit.

STEP 2

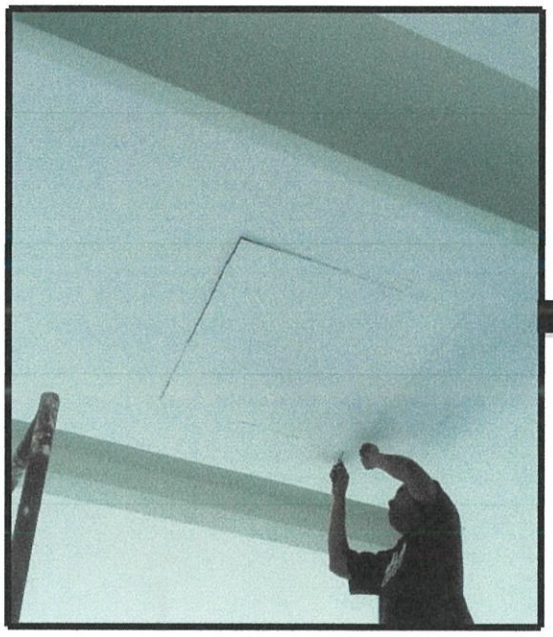


Photo 3.18 cutting ceiling

Photo 3.19 removed frame ceiling

Method installation of cassette unit for step 2 is ceiling cutting. Firstly, Ceiling will be cutting after the workers create a mark size air-conditioning cassette unit. Waste of ceiling will be removing to place cassette unit. After remarks size of cassette unit knife will be used to cutting the ceiling so that the worker can included cassette unit into the size that has been measured.

STEP 3

Photo 3.20 removed frame ceiling

Method installation of cassette unit for step 3 is removing aluminum frame ceiling. Aluminum frame must be removed because cassette unit will be included in the ceiling. Cutting plier will be used to remove aluminums frame ceiling. The worker must confirm that area of hole must clear and clean from any object to easier installation of cassette unit. Scaffolding will be used because the ceiling is higher from the floor. Besides that, it also can make the worker easier to lifting cassette unit.

STEP 4

Photo 3.21 cutting steel rod

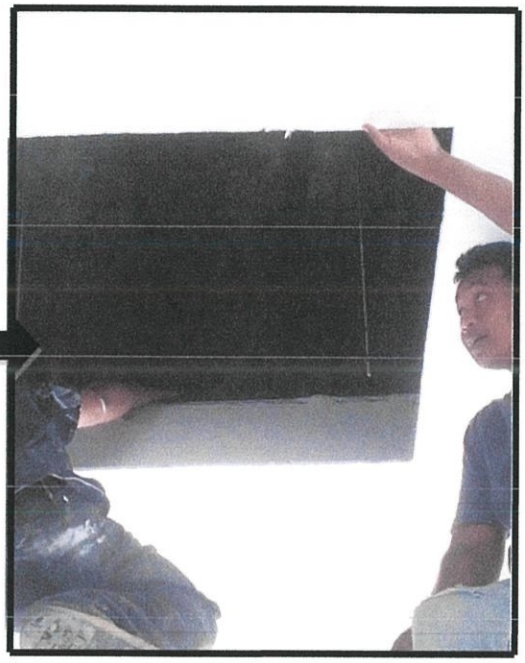


Photo 3.22 screw steel rod at ceiling

Method installation for step 3 is cutting steel rod on suitable size. The steel rod will be cutting according to the distance between the ceiling and wall. Steel rod will be cutting using machine cutting in 90mm length. After that, the worker must use machine drill to make hole for steel rood. Next, steel rod will be included on the hole and nut will be used for finishing steel rod so the worker must neatly close the nut by using plier into the wall. Steel rod must be strong mounted at the wall for support load from air-conditioning cassette unit. Installation cassette unit need 4 steel rods. Each 1 steel rod will install at the corner of rectangle cassette unit.

STEP 5

Photo 3.23 lifting cassette unit

Photo 3.24 screw the cassette unit

Method installation of cassette unit for step 5 is lifting cassette unit to neatly with nut at steel rod. After steel rod neatly close at the wall cassette unit will be lifted to neatly with nut at plat of air-conditioning cassette unit. Plier will be used to neatly the nut at plat of cassette unit. Before cassette unit will be lifting the worker must remove their cover and filter to easier neatly nut. Cover cassette unit will be removing by using screwdriver.

STEP 9

Photo 3.25 install cover

Photo 3.26 screw the cover

Next, method installation of cassette unit for step 6 at ground floor is installing covering cassette unit. Before put the cover at cassette unit the worker must confirm cassette unit is neatly with steel rod to avoid from any hazard example like falling down on the floor. Next, cover will be installing by worker which screws the screw cover at the cassette unit.

STEP 7

Photo 3.27 install filter

Photo 3.28 finish cassette unit

Final method installation of cassette unit is installing filter cassette unit. Lastly, filter will be installing after finishing installation covering cassette unit.

3.4 Differences Advantages and Disadvantages of Cassette Unit and split unit

Table 3.1 Advantage and Disadvantage Air Conditioning

Air-conditioning	Split unit system	Cassette unit
Advantage	1. For those who own homes with several rooms a split system air conditioner has many advantages over window or wall air conditioners. One advantage is that you won't have to purchase a separate air conditioner for each room as many split air conditioners can provide cooling to four separate areas of your home. 2. Each zone can be set at the temperature you want to maintain and you can even turn off the air in certain areas when they are not in use. 3. A second advantage to these units over window or wall units is	1. Very low noise output Ceiling cassette units are extremely quite when in use this goes for both the indoor & outdoor units. Most customers find they barely notice them after just a couple of weeks. 2. Ceiling cassette units have a clean modern look & fit in well in the majority of environments, including shops and large offices. These type are relatively quick and easy to install (especially in comparison to air conditioning installation of other types of unit). 3. This is partly due to the fact that they are

	that you don't need a window or an outside wall to cool a room. You can mount the outside portion on the roof and install the inside portion on the ceiling allowing for a room to be cooled whether there is an outside wall or window or not.	compact and light in weight. The cooled or heated air can be distributed evenly or in a specific direction giving the user lots of control. 4. This helps keep the environment at an ideal comfort level for all employee.
Disadvantage	1. One of the biggest disadvantages to the mini *split system air conditioner* is its cost. It is estimated that purchasing and installing these air conditioners is twice as expensive as installing a window or wall air conditioner and 30% higher than installing central air conditioning. 2. That it can often be difficult finding someone who is willing to install (Acboy, 2013)	1. Type of cassette unit Needs to be professionally installed which can be expensive. Cassette unit more expensive than portable or window units. This type air conditioning has separate internal and external units that must be joined which require drilling and permanent fixing with electrical isolators (Acboy, 2013)

3.5 Component of air-conditioning split unit

3.5.1 Compressor

According to (kay A,2013) the compressor is the heart of the cooling cycle. The cycle begins when the compressor draws in cool, low-pressure refrigerant gas from the indoors. The motor-driven compressor's sole function is to "squeeze" the refrigerant, raising its temperature and pressure so that it exits the compressor as a hot, high-pressure gas.

1) Heat Transfer

The compressor pushes the hot gas to the finned condenser coil in the outdoor side of the air conditioner where fans blow cool outside air over the coil and through the fins, extracting the heat from the refrigerant and transferring it to the outside air.

2) Turns Liquid

When enough heat has been extracted from the refrigerant, it condenses into a warm liquid that passes under high pressure to an expansion valve that turns the refrigerant into a cool, low-pressure liquid. The refrigerant goes from the expansion valve to the finned evaporator coil located in the indoor or room side of the air conditioner unit.

3) Absorbs Heat

When the refrigerant enters the evaporator coil where the pressure is much lower, it is chemically compelled to evaporate into a gas. This process requires heat, which comes from the room's warm air being blown over the evaporator coil by another fan. As room heat is transferred to the evaporating refrigerant, the room's air grows cooler. The refrigerant, now back to a cool, low-pressure gas, is drawn back into the compressor to continue the cycle.

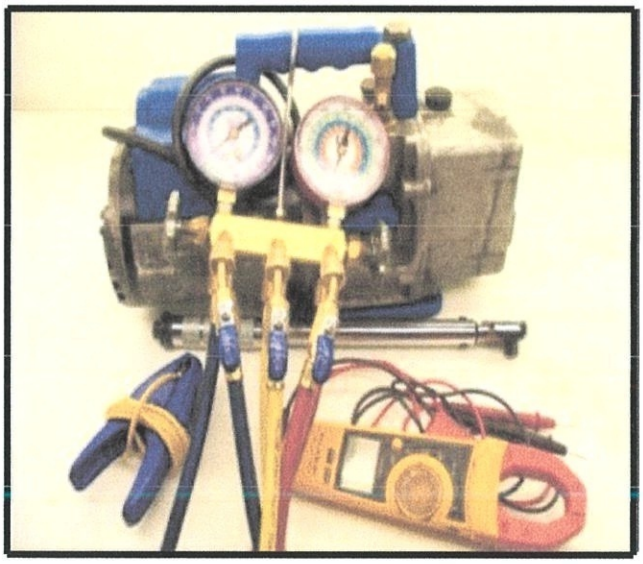
3.5.2 Remote control

The remote control offered with the product expresses the features essential to the air conditioner's performance with buttons, each of which is specific to a function. In other remote controls, except for the very old ones, some symbols may be grouped on a single button, using which, by pressing it repeatedly, you can scroll through the functions in order to select the one that you desire (jenkins, 2003).

Picture 3.29 Remote control

3.5.3 Vacuum

The purpose of a vacuum pump is to remove moisture and air from compressor. A vacuum pump removes moisture by lowering the system and vaporizing or boiling off the moisture, then exhausting it along with air (jenkins, 2003).



Picture 3.30 vacuum

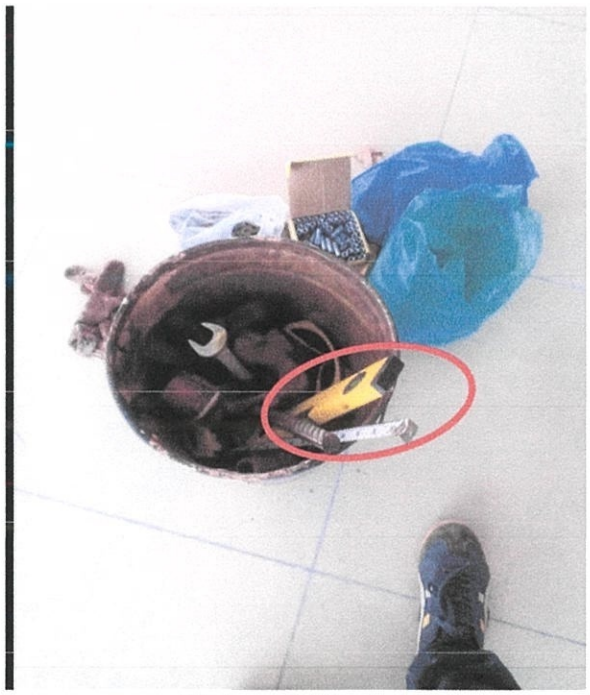
3.5.4 Gas

The refrigeration process relies on one principle, that an expanding gas absorbs heat. If you ever have let air out of a tire, you have felt the valve stem get very cold. The same applies to a CO2 fire extinguisher. As the CO2 expands it absorbs so much heat that water vapor in the air solidifies as frost. In the closed refrigeration system, a pump is used to compress a gas and the hot gas is cooled in the ambient air around the unit in the condenser section (jenkins, 2003).

Picture 3.31 gas refrigeration

3.6 Equipment of Air-Conditioning

Table 3.2 List of equipment

Equipment	Description
 **picture 3.32** drill	Equipment of drill is used to hacking wall to make a hole at wall.
 **Picture 3.33** Spirit level	An instrument to show a surface is horizontal is level or vertical is plumb.

 **Picture 3.34** measuring tape	Measuring tape will be using to measure length around object.
 **Picture 3.35** grinder machine	Function of grinder machine is used to cutting any steel.

 **Picture 3.36** knife ceiling	Function of knife ceiling to remove ceiling in something shape. For example cutting ceiling to included cassette unit.
 **Picture 3.37** hammer	Hammer is a tool meant to deliver an impact to an object. For example knock the steel rod include on wall.

 **picture 3.38** screw driver	A flat head screwdriver is used to drive or to screw screws.
 **picture 3.39** plier	Plier is a hand tool used to hold objects.

3.7 Safety and Health

3.7.1 Personal protective equipment (PPE)

Personal protective equipment (PPE) is clothing, equipment or substances designed to be worn by someone to protect them from risks of injury or illness. PPE should only be considered as a control measure when exposure to a risk cannot be minimized in another way, or when used in conjunction with other control measures as a final barrier between the worker and the hazard. PPE does not control the hazard at the source. There is several personal protective equipment that they using in construction.

3.7.1.1 Safety helmet

Safety helmet is used to protect head from any danger. Safety helmet is very important because it can reduce the impact of material that hit the head. So to prevent any injuries to head they have to wear the safety helmet.

Picture 3.40 safety helmet

3.7.1.2 Safety boots

Safety boots is most important personal protective equipment. Safety boots is very important to protect feet from injuries. The material use to make safety boots is rubber. This because rubber is water resistant. The soffit of the boots should thick enough to protect the feet from dangerous material at ground.

Picture 3.41 safety boots

3.7.1.3 Gloves

Gloves are on of personal protective equipment. Gloves are to protect hand from any injuries because of dangerous material. The material that usually uses to make gloves is cotton. This because it smooth and comfortable. Cotton gloves also can give protection to hand.

Picture 3.42 safety gloves

CHAPTER 4

CONCLUSION AND RECOMMENDATION

4.1 Recommendations

A big problem for this construction site is about safety wear. Some of worker not wearing the safety equipment like boot, helmet and gloves for their protection in construction site. Safety is important for construction site it is protection body from any accident. Besides that, improper working platform while construction of bored pile. Do not use jack base may cause scaffolding collapse or sunk in the ground. If not wearing equipment of safety the worker may die in accident construction site.

Recommendation for this construction site is put the signage on site and had a toolbox every week to remind the workers about safety. Safety supervisor should check the working platform is proper to use for construction of bored pile. If cannot be used they should prepare other working platform. Site supervisor must check and find the worker do not wear safety. Penalize workers who do not wear safety first during construction site.

Picture 4.1: Signage on Construction Site

4.2 Conclusion

My practical training takes time 5 months I was here. I have learned a lot about the practices at site and office. The company is doing construction on industrial building. Therefore, I have made a report titled methods of installation air-conditioning using split unit and cassette unit. Firstly, split unit system is difference included installation, size and horse power with other air-conditioning system. Most of user install split unit at their home because size is small, easy to install and economical. For the building apartment have 5 type of horse power is 1HP, 1.5HP, 2HP, 3HP, 5HP will install at every service rooms.

Next, cassette unit system is unit air-conditioning to supply cold air in a big area. They are more difficult to installation because cassette unit mounted at the ceiling. They are suitable for big of area like hall or others room. For completing this task, i can increase the knowledge about the method installation air-conditioning of the building apartment with different types of cassette unit and split unit element. The method installation is different because of the different installation and size. The good finishes of air-conditioning will give the good characteristics and appearance to the building purpose.

For the conclusion, Viana court of apartment is still new building in Wakaf Che Yeh Kelantan. The building is still in good condition and do not have any problem in installation air-conditioning. The building has no significant damage. So, i conclude for our case study that air conditioning type of split unit and cassette unit is suitable for this building it is can controlling the humidity, ventilation, and temperature each every service room.

REFERANCE

Interview:

1. Mr. Mohd Hafizuddin Bin Mazlan (C.O.W Mechanical & Engineering)
2. Mr. Alif Badrulzaman Bin Mahadi (C.O.W Site Engineering)
3. Mr. Zulkiflee Bin Ibrahim (Site supervisor for Company Contractor MJ Utama Bina Sdn. Bhd.)
4. Mr. Mohd Khatib Bin Che Salleh (sub con air-conditiong)

Book

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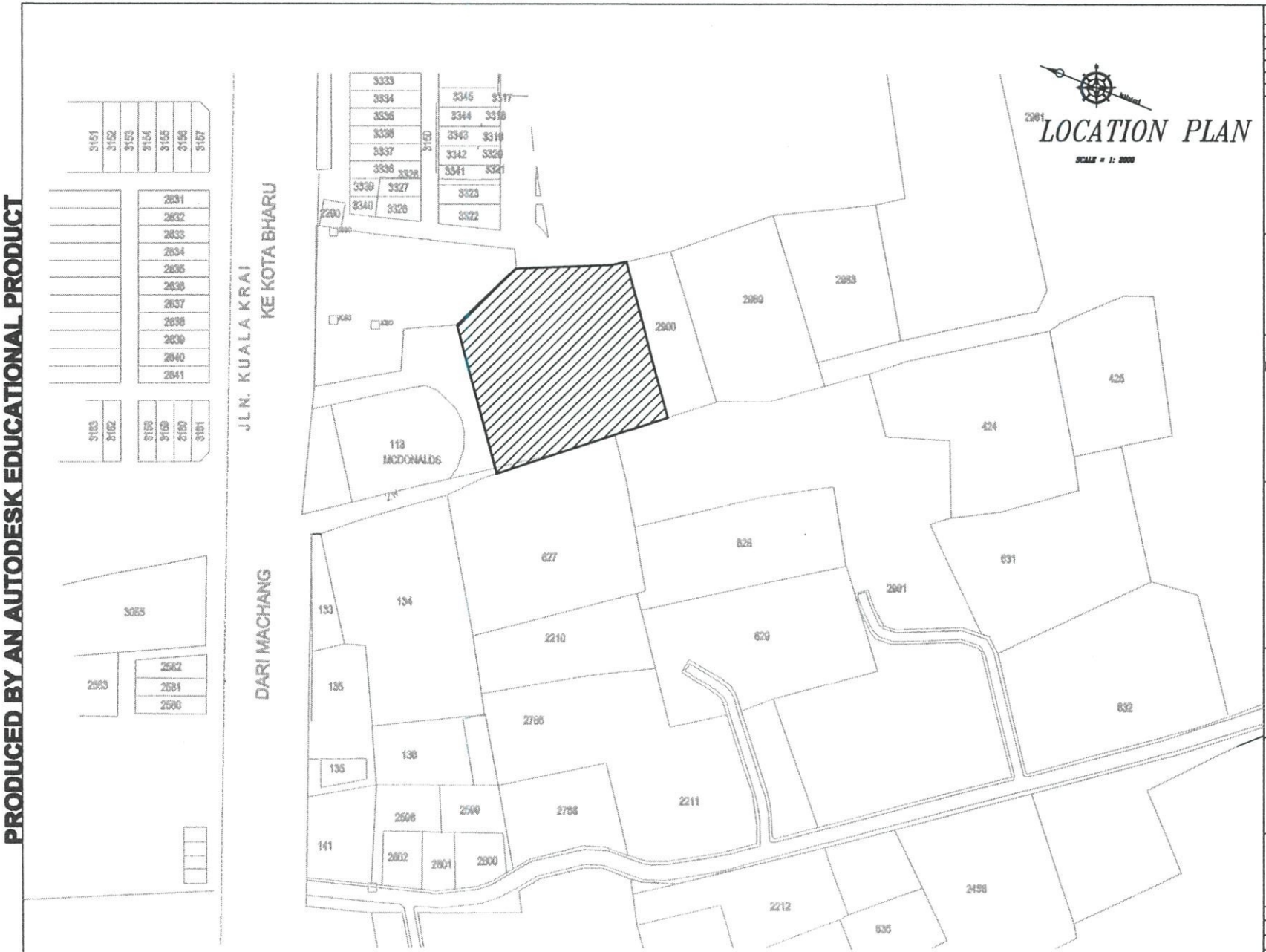
APPENDIX



NO.	PINDAAN	TARIKH	DIBUAT

PEMILIK:

PENGARAH
ASPIRASI VISHA DEVELOPMENT SDN. BHD.
LOT 3501, 1ST FLOOR
JALAN SULTAN YAHYA PETRA LUNDANG
16000 KOTA BHARU

ARKITEK:

Shah Architect

PROJEK :

POHON KELULUSAN PELAN PINDAAN
SEBUAH BANGUNAN APARTMEN SERVIS
14 TINGKAT YANG MENGANDUNGI;
156 UNIT APARTMEN KEPADA
160 UNIT APARTMEN, DEWAN SERBAGUNA,
RESTORAN DAN RUANG LETAK KERETA,
DIATAS LOT 2992,
SEKSYEN 62,
MUKIM PADANG ENGGANG, DAERAH KOTA,
(WAKAF CHE YEH)
JAJAHAN KOTA BHARU,
KELANTAN DARUL NAIM

MECHANICAL & ELECTRICAL ENGINEERS :

Inisiatif Sdn. Bhd.

SUB-CONTRACTOR M & E:

DAYAMAJU ENTERPRISE
LOT 1001, PENGKALAN BARU,
BERIS KUBUR BESAR,
16050 BACHOK, KELANTAN.

TAJUK LUKISAN :

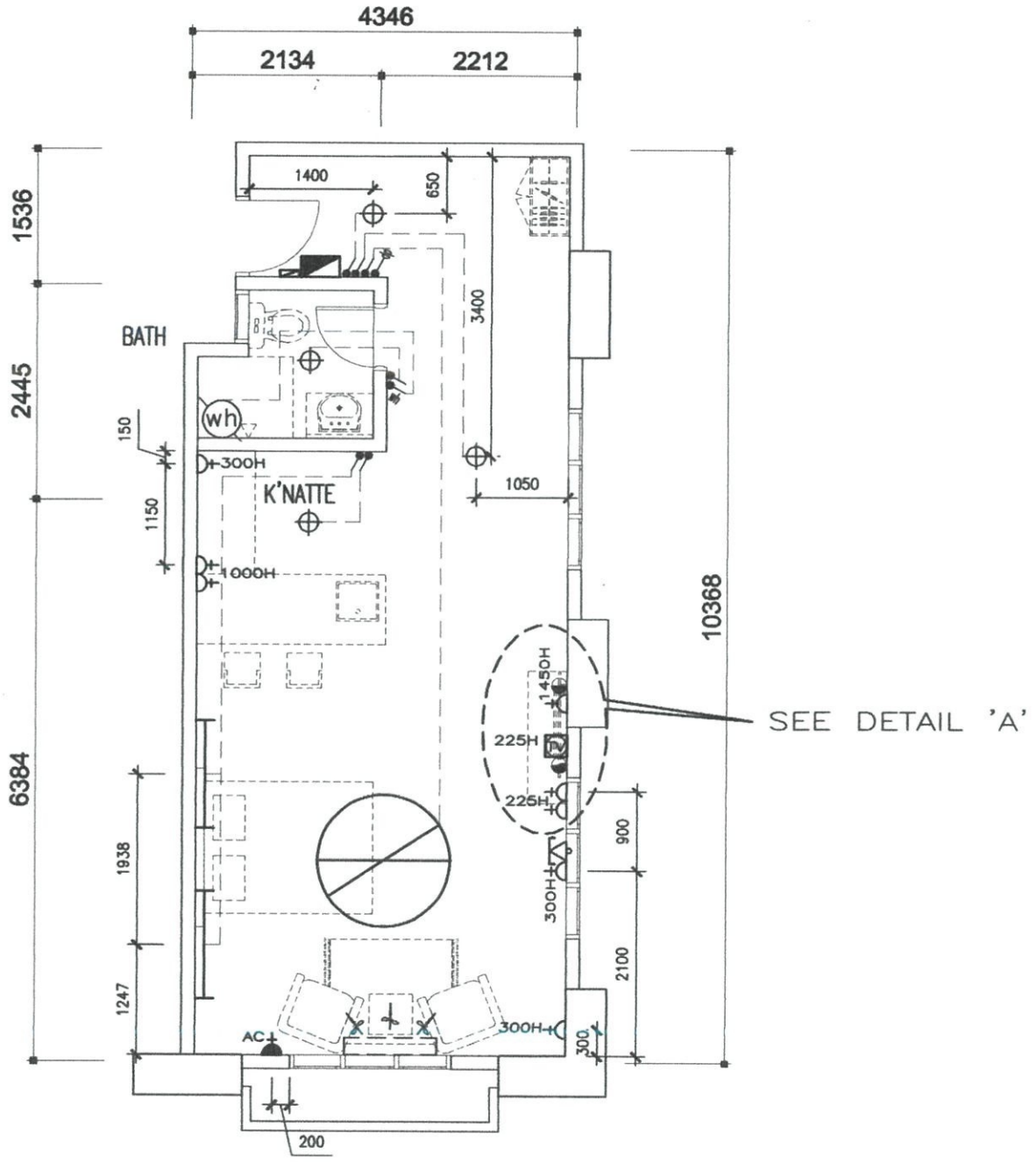
SITE PLAN

TELEPHONE SERVICES

DESIGN BY : SMW	CHECKED BY : ASHAR
DRAWN BY : DH	APPROVED BY :
ACAD FILE :	DATE : 20-7-2012
SCALE : 1 : 250	

PROJECT NO :

IR/M&E/159/VC/TEL-01



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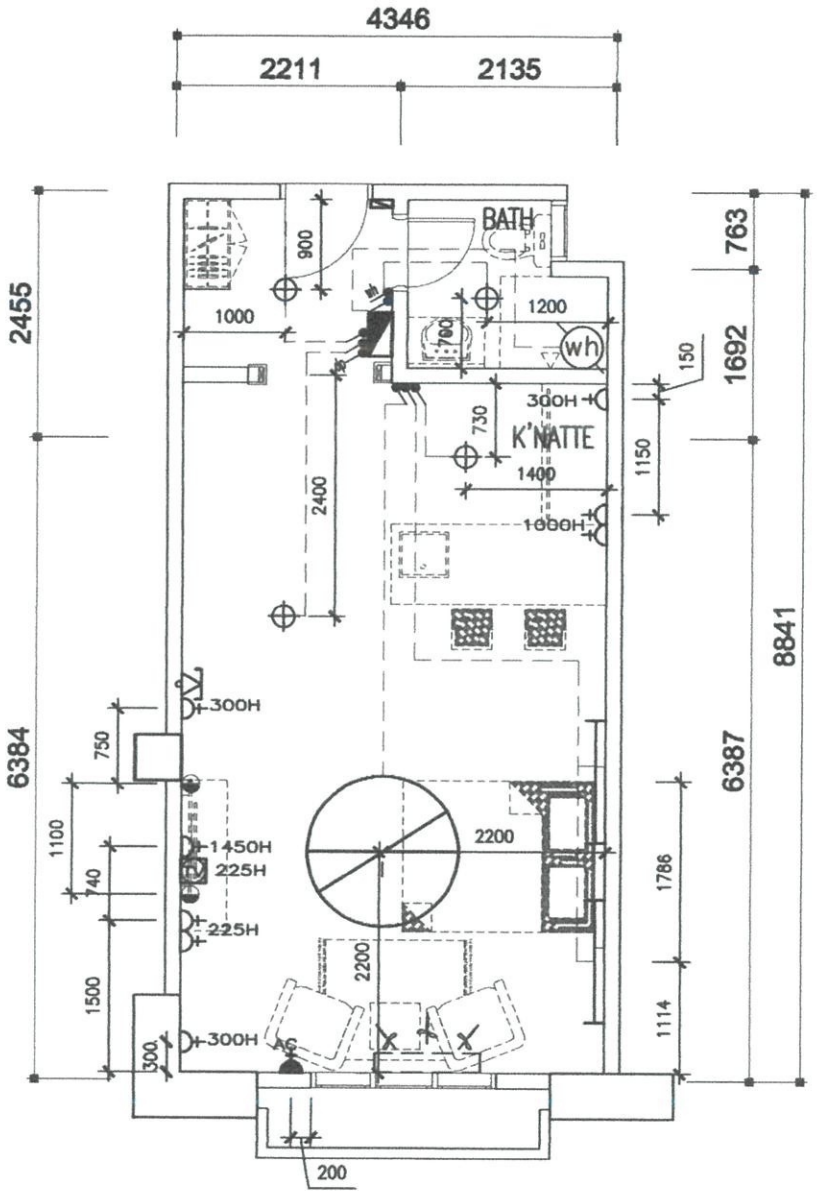

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