**DEPARTMENT OF BUILDING**

**UNIVERSITI TEKNOLOGI MARA**

**(PERAK)**

# UNDERGROUND PIPING INSTALLATION AT THE CONSTRUCTION SITE

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**UNIVERSITI TEKNOLOGI MARA**

**(PERAK)**

**DECEMBER 2019**

It is recommended that the report of this practical training provided

**By**

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# UNDERGROUND PIPING INSTALLATION AT THE CONSTRUCTION SITE

Accepted in partial fulfilment of requirement has for obtaining Diploma in Building.

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**DEPARTMENT OF BUILDING**

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**DECEMBER 2019**

## STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references are stated herein, prepared during a practical training session that I underwent at Kitacon Sdn Bhd for a duration of 20 weeks starting from 5 August 2019 and ended on 20 December 2019. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

.....

Name : NURUL SARAH BINTI MOHAMAD SINATRA

UiTM ID No : 2017213432

Date :

## ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah, the Most Merciful, the Most Graceful.

I would like to extend my gratitude to Kitacon Sdn Bhd for this internship opportunity I had for five months. The guidance, advice and help rendered throughout the period of training have thought me a lot in both mentally and physically. First and foremost, I would like to thank Mr Tan Ah Kee, Chief Executive Officer for the opportunity given, to conduct my training in his esteem company. His team of professionals comprising of Mr Gam Boon Tin as Senior General Manager, Mr Kuik Shao Chu as Senior Construction Manager, Mr Yao Hooi Tian as Site Manager, En Mohd Basyir as Site Engineer, Mr Edwin Leon as Site Supervisor and En Muhammad Faizul as Junior M&E Coordinator have enabled me to learn and develop my understanding, knowledge and feel of real time projects, and the theory involved in analysis of structures, building, civil works and mechanical and electrical works in site construction.

I would also like to thank ALL the UiTM lecturers that have taught and nurtured me in becoming a better student and person. I would also like to extend my deepest appreciation to the lecturers who are directly involved during my training stint. To En. Azamuddin Bin Husin, Supervising Lecturer, En. Muhammad Naim Bin Mahyuddin, Practical training Coordinator and Dr. Dzulkarnaen Bin Ismail, Programme Coordinator. I value the time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and the valuable knowledge that have been shared over the last few semesters.

Last but not least, my special thanks to my beloved parents for their sacrifices over the years.

Thank you so much.

## ABSTRACT

Underground piping is an important element in any mechanical and electrical works. Underground piping is a system of pipes used to convey solid or fluids from one location to another. It is specially design as an efficient transporter of wires, cables and fluids. Underground piping usually been buried after beam casting and before the backfilling earth works, lean concrete and ground slab casting. It works efficiently underground as engineers have studied its capability of carrying heavy loads. Underground piping consists of several elements such as sanitary pipes, rainwater downpipes, corrugated electrical pipes and telephone pipes. This study conducted at an ongoing construction site, Proposed Construction And Completion Of 168 Units Double Storey Link House Type 1 And 1 Unit Of Tnb Substation With Infrastructure Works On Part Lot 368, Phase Ev5A Elmina West, Seksyen U15,40170 Shah Alam, Selangor Darul Ehsan.Finally, the problems arising and solution that is implemented on site via observation.

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# CHAPTER 1.0 INTRODUCTION

## 1.1 Background and Scope of Study

Underground piping are installed before the back filling process and lean concrete process on ground slab. Underground piping can also be divided into two types which is mechanical and electrical works. Mechanical Underground Piping consists of Rain Water Down Pipe (RWDP) and Sanitary Pipe which will be inspected through the pipe flow test. Meanwhile, for Electrical Underground Piping consists of Corrugated Electrical Pipe and Telephone Pipe.

Piping systems are prevalent throughout our everyday world. Most of us think of piping systems as underground structures used to convey liquids of one sort or another. To the novice, the concept of pipeline installation underground sounds relatively straight forward: a) dig a trench, b) lay the pipe in the trench, and c) fill the trench back in. While this simplified perspective of pipeline construction may be appealing, it does not begin to address the engineering concepts involved in the underground installation of a pipeline.

PE piping is considered "flexible" pipe. Flexible pipes can deflect up to their allowable deflection limit without damage. Most PE pipes can withstand large amounts of deflection without damage but for practical purposes PE pipes are limited to 7.5% deflection or less depending on the DR and application. For PE pipes, flexibility is directly proportional to the Dimension Ratio (DR). Low DR pipes such as DR 7.3 have high resistance to deflection because their flexibility is very low, or conversely their stiffness is high. DR 7.3 has a Pipe Stiffness (PS) per ASTM D2412 of about 1600 psi. On the other hand DR 32.5 pipe has a PS of about 12.5 psi. Such a wide range in flexibility across a product line means different installation requirements for different DR's may be necessary to achieve successful and economical installations. The depth of cover and anticipated surface loads also affect the particular installation requirements. (Handbook of Polyethylene Pipe)

According to Michael C. Webb "an environmentally safe underground piping system for liquid fuels and chemicals which interconnects and underground liquid storage tank to one or more above ground liquid storage tank to one or more above ground liquid dispensing units, that provides a complete secondary containment system for the entire primary liquid supply piping system. The piping systems employs one tank access chamber interconnected to one or more dispenser access chambers by a double walled pipe. The double wall pipe provides an interstitial space for gravity flow of any liquids, from any point in the primary liquid supply piping system, to an access chamber, which also serves as a liquid collection sump, for purposes of leak detection."

A secondarily contained underground piping system which interconnects at least one abobe-ground dispensing unit. The system includes an originating chamber surrounding the dispensing pump and having at least one opening therein for pipe access thereto. A terminating chamber is positioned directly under the above-ground dispensing unit and includes at least one opening therein for pipe access thereto. A transfer pipe is operably connected from the dispensing pump to the above-ground dispensing unit, and passes through the openings in the originating chamber and the opening in the terminating chamber. Seals are provided for sealing the passage of the transfer pipe through the openings. The transfer pipe includes an inner primary supply for transferring fuel and an outer secondary containment pipe for defining an interstitial space between the primary pipe and the containment pipe. (Webb, 1993)

Figure 1 shows Sanitary Services on Ground Floor Plan - Type A (Standard) that consists of 4 pipes in total such as Rainwater Down Pipe, Ventilation Pipe, Water Closet Pipe and Floor Trap.

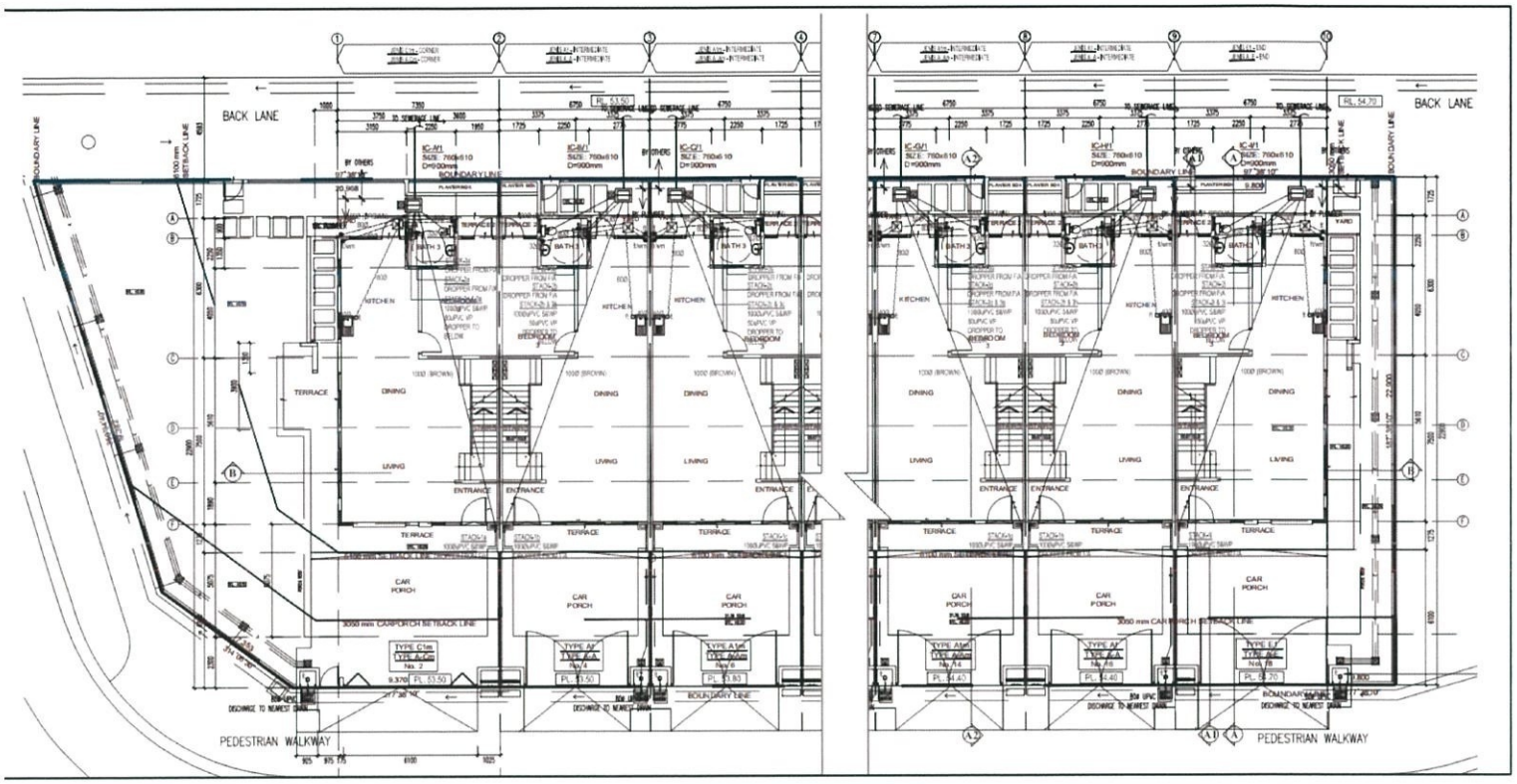



Figure 1.1 Sanitary Services on Ground Floor Plan - Typa A (Standard)

Figure 1.2 shows Electrical Services Plan on undergound that consists of telephone pipe and corrugated electrical pipe.

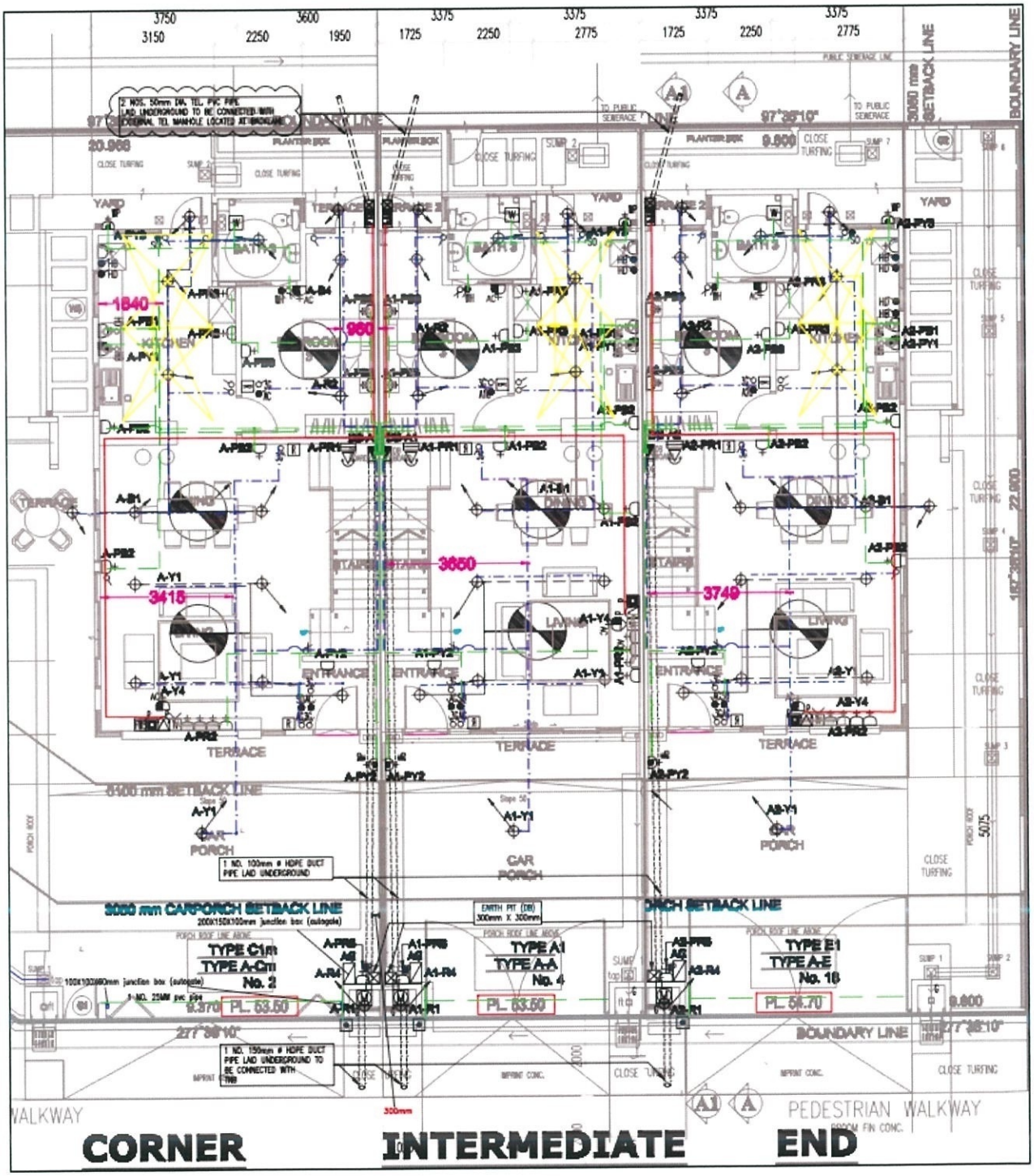



Figure 1.2 Electrical Services – Telephone pipe and Corrugated Electrical Pipe

## 1.2 Objectives

1. To identify the type of pipes used are approved type and according to specification.
2. To ensure all pipes installation are inspected and tested as per requirement.

## 1.3 Method of Study

Method of study used during the completion of this report:

### 1.3.1 Primary

i) Observation

- Observation is done during the underground pipes installation on site as it progresses daily towards completion.

ii) Interview

- Question and answer session are made from time to time with Project Manager, Site Supervisor and Construction Worker regarding any doubts or misunderstanding of any process of the underground piping installation.

### 1.3.2 Secondary

iii) Books and Internet

- Books and internet are used as reference to support the knowledge gained during lecture in class regarding underground piping installation and solution for any underground piping installation issues.

# CHAPTER 2.0 INTRODUCTION OF COMPANY

KITACON SDN BHD is a building and civil engineering company based at No 24A & B, Jalan Rengas, Taman Selatan, 41200 Klang, Selangor Darul Ehsan. KITACON SDN BHD was established since 19th March 1990. This company was formed up by two directors Mr Tan Ah Kee and Mr Teow Choo Hing. Several companies are believed to have sharing holders with these two directors which is LEMBAH REKA SDN BHD and KIHARTA RESOURCES SDN BHD. The rapid growth of this construction company was managed by the Chief Executive Officer, Mr Tan Ah Kee.

KITACON SDN BHD are well known among developers' company. These several developers such as SIME DARBY, WORLWIDE HOLDINGS BERHAD, GAMUDA, SETIA ECOHILL and more have hired this construction company as their main contractor. This is because of the wide experience of the directors and management staffs. Throughout the years, KITACON SDN BHD has completed with a total number of 256 projects in Kuala Lumpur, Selangor, Negeri Sembilan and Johor since December 1990. (Handbook of Polyethylene Pipe)

## 2.2 Company Profile

**Registered Name of Company :**

KITACON SDN BHD

**Company Registration No :**

195139D

**Date of Incorporated :**

19th MARCH 1990

**Authorised Capital :**

RM 25,000,000.00

**Paid Up Capital :**

RM 20,000,000.00

**Business Address :**

NO 24A & B, JALAN RENGAS, TAMAN SELATAN,41200 KLANG, SELANGOR.

**Name of Directors :**

MR TAN AH KEE

MR TEOW CHOO HING

**Auditor :**

CROWE HORWATH

**Principal Bankers :**

CIMB BANK BERHAD

HONG LEONG BANK BERHAD

STANDARD CHATERED BANK

UNITED OVERSEAS BANK

## 2.3 Organization Chart

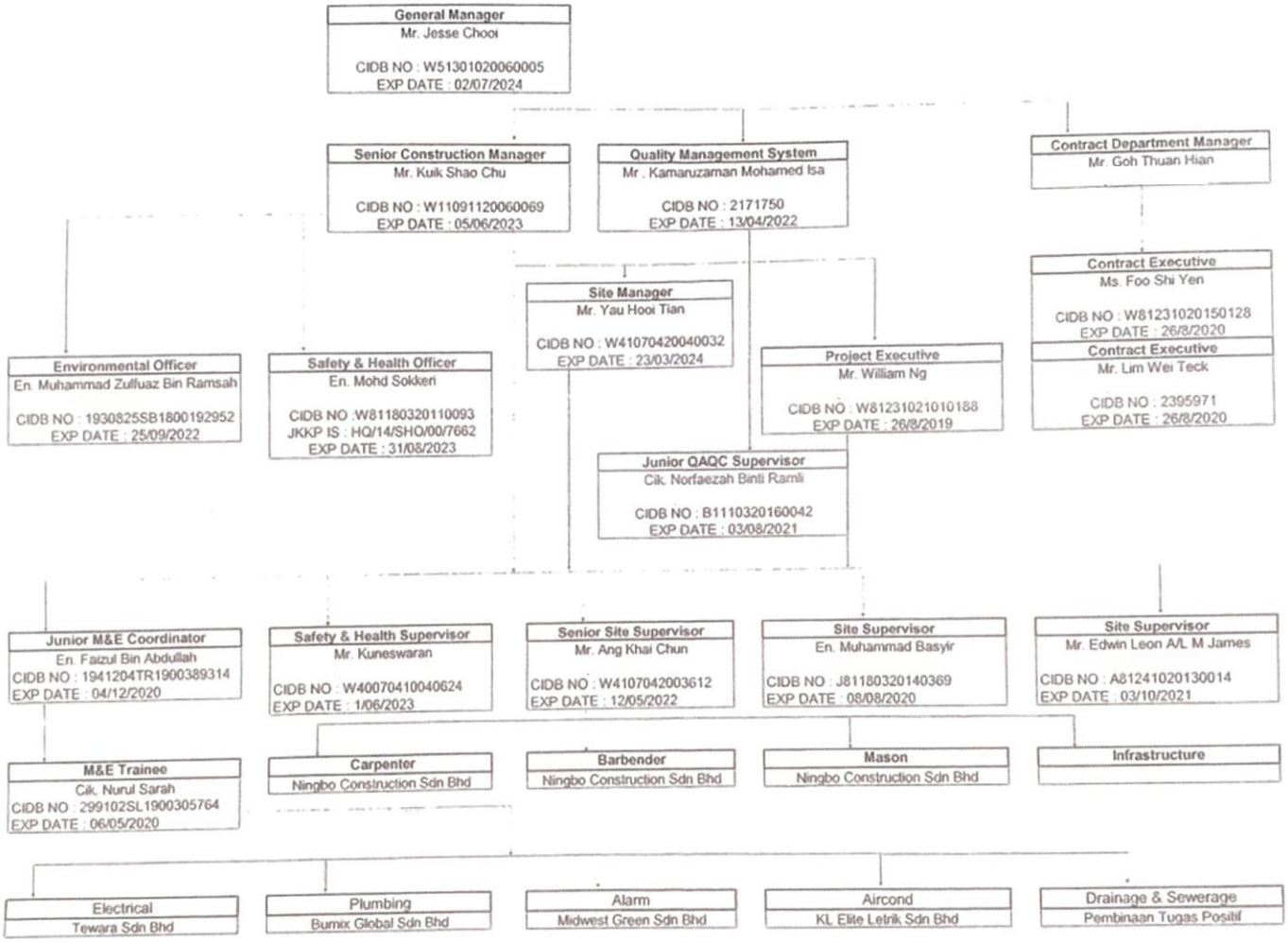



Figure 2 A Site Organizational Chart

Figure 2 above shows a site organizational chart. This site is held by a General Manager, Mr Jesse Chooi along with three senior managers under him such as Mr Kuik Shao Chu as Senior Construction Manager, Mr Kamarazzaman as Quality Management System and Mr Goh as Contract Department Manager. Mr Yau Hooi Tan has been given responsibilities to manage the site as Site Manager with the help of six supervisors such as Junior M&E Coordinator, Safety & Health Supervisor, Senior Site Supervisor, Site Engineer, Site Supervisor and M&E Trainee along with sub contractors that has been chosen. For example, carpenter, barbender, mason, infrastructure in civil and structure works while in mechanical and electrical services are electrical, plumbing, alarm, aircond, drainage and sewerage. Next, there are Environmental Officer and Safety and Health Officer at the site.

## 2.4 List of Project

### 2.4.1 List of Completed Project

| NO | CLIENT | NAME OF PROJECT | PROJECT VALUE (RM) | DATE OF AWARD AND COMPLETION |
|---|---|---|---|---|
| 1 | SIME DARBY PAGOH DEVELOPMENT SDN BHD | PROPOSED CONSTRUCTION AND COMPLETION OF 206 UNITS DOUBLE STOREY TERRACE HOUSE PHASE R20 AND 1 UNIT TNB SUBSTATION INCLUDING INFRASTRUCTURE AND ASSOCIATED WORKS ON PART OF LOT PTD 14418, MUKIM JORAK, DAERAH MUAR, JOHOR DARUL TAKZIM | 40,894,580.47 | 13 JUN 2016 TILL 13 APRIL 2018 |
| 2 | SIME DARBY ELMINA DEVELOPMENT SDN BHD | CADANGAN MEMBINA DAN MENYIAPKAN 67 UNIT RUMAH TERES DUA TINGKAT BESERTA 1 UNIT PENCAWANG ELEKTRIK DAN KERJA-KERJA INFRASTRUKTUR BERKAITAN DI ATAS SEBAHAGIAN LOT 360, FASA G38, ELMINA, SEKSYEN U16, SHAH ALAM, SELANGOR DARUL EHSAN | 36,366,480.00 | 23 JUN 2016 TILL 22 MAR 2018 |
| 3 | SIME DARBY ELMINA DEVELEPMENT SDN BHD | CADANGAN MEMBINA DAN MENYIAPKAN 151 UNIT RUMAH TERES 2 TINGKAT (FASA EV3B) BESERTA 2 UNIT WAKAF, 1 UNIT PENCAWANG ELEKTRIK (DOUBLE CHAMBER) DAN KERJA-KERJA INFRASTRUKTUR BERKAITAN DI ATAS PT 52872 DAN PT 50037 DAN LOT 360, ELMINA WEST, SEKSYEN U15, 40160 SHAH ALAM, SELANGOR DARUL EHSAN | 65,561,000.00 | 9 JUN 2016 TILL 17 APRIL 2018 |
| 4 | BANDAR SETIA ALAM SDN BHD | CADANGAN MEMBINA 127 UNIT RUMAH TERES 2 TINGKAT (18' x 65') YANG MENGANDUNGI JENIS RT1-A (69 UNIT) DAN RT1-B (58 UNIT) BESERTA SEBUAH PENCAWANG ELEKTRIK DI ATAS LOT PT 35602 HINGGA PT 35728 DAN LOT PT 36195, SETIA ALAM, SEKSYEN U13, 40170 SHAH ALAM, SELANGOR DARUL EHSAN | 24,084,864.09 | 24 OCT 2016 TILL 20 APRIL 2018 |
| 5 | SETIA ECOHILL 2 SDN BHD | CADANGAN MEMBINA 84 UNIT RUMAH KLUSTER 2 TINGKAT YANG MENGANDUNGI 44 UNIT JENIS RKL1-81 (32' x 60') DAN 1 UNIT PENCAWANG ELEKTRIK DI ATAS SEBAHAGIAN LOT 39, MUKIM BERANANG, DAERAH HULU LANGAT, SELANGOR DARUL EHSAN | 19,408,363.77 | 19 DEC 2016 TILL 18 MAR 2018 |
| 6 | SAPPHIRE INDEX SDN BHD | CADANGAN PEMBANGUNAN PERUMAHAN 'GATED COMMUNITY STRATA' (STRATA BERTANAH) FASA 2B 124 UNIT RUMAH TERES 2 TINGKAT, 11 UNIT RUMAH TERES 3 TINGKAT DAN 1 UNIT PENCAWANG ELEKTRIK DI ATAS SEBAHAGIAN LOT PT 33022 & PT 33023, MUKIM TANJONG DUA BELAS, DAERAH KUALA LANGAT, SELANGOR DARUL EHSAN | 59,500,000.00 | 18 NOV 2015 TILL 28 FEB 2018 |

Table 1.1: List of Completed Projects

| | | | | |
|---|---|---|---|---|
| 7 | BANDAR SETA ALAM SDN BHD | [BSA - 48# TSCH (32' x 70') RKL7A-K (24 UNIT) EXIMIA AT P11] CADANGAN MEMBINA 48 UNIT RUMAH KLUSTER 3 TINGKAT (32' x 70') YANG MENGANDUNGI JENIS RKL7A-K (24 UNIT) DAN JENIS RKL7A-L (24 UNIT) DI ATAS LOT PT 32785 HINGGA PT 32832, SEKSYEN U13, SETIA ALAM, 40170 SHAH ALAM, SELANGOR DARUL EHSAN | 18,552,126.25 | 1 DEC 2017 TILL 30 APR 2018 |
| 8 | KL-KEPONG COUNTRY | CADANGAN PEMBANGUNAN 109 UNIT RUMAH TERES 2 TINGKAT (22' x 75') DI ATAS LOT PT30164 - PT30272 BERSAMA SEBUAH PENCAWANG ELEKTRIK TNB, DI ATAS LOT PT31022, PRESINT 382 DI ATAS SEBAHAGIAN LOT 851 (LOT CT12606), BANDAR SERI COALFIELDS, MUKIM IJOK, DAERAH KUALA SELANGOR | 31,632,000.00 | 17 MAY 2017 TILL 17 DEC 2018 |
| 9 | I&P ALAM IMPIAN SDN BHD | PROPOSED CONSTRUCTION AND COMPLETION OF 127 UNITS DOUBLE STOREY TERRACE HOUSES AND LOCAL INFRASTRUCTURE AT PHASE A2-05, ALAM IMPIAN, SEKSYEN 35, 40470 SHAH ALAM, (PHASE2) SELANGOR DARUL EHSAN | 25,690,000.00 | 6 FEB 2017 TILL 7 JAN 2019 |
| 10 | WORLDWIDE HOLDING BERHAD | CADANGAN MEMBINA 41 UNIT RUMAH BANGLO YANG TERDIRI DARIPADA:- A) FASA 1 - 29 UNIT RUMAH BANGLO JENIS 1,2,3 & 4 DAN 1 UNIT PENCAWANG ELEKTRIK TNB & 1 UNIT WAKAF B) FASA 2 - 12 UNIT RUMAH BANGLO JENIS 2 & 3 DI ATAS SEBAHAGIAN LOT 39719 (PT 32777), ZON 5, JALAN NOVA U5/95, SEKSYEN U5 SUBANG BESTARI, 40150 SHAH ALAM SELANGOR DARUL EHSAN | 52,480,000.00 | 16 JUN 2015 TILL 31 AUG 2018 |
| 11 | ALAM IMPIAN SDN BHD | CADANGAN MEMBINA 49 UNIT RUMAH TERES 2 TINGKAT FASA A3-05 DAN SATU UNIT PENCAWANG ELEKTRIK DI ALAM IMPIAN SEK. 38 SHAH ALAM SELANGOR DARUL EHSAN | 17,988,000.00 | 6 APR 2017 TILL 5 MAR 2019 |
| 12 | I&P ALAM IMPIAN SDN BHD | CADANGAN MEMBINA DAN MENYIAPKAN 12 UNIT KEDAI PEJABAT DUA TINGKAT DALAM FASA A5-08 DI ATAS PT 146857 DAN PT 142896 FASA 05-08 SEKSYEN 35, 40470 SHAH ALAM, SELANGOR DARUL EHSAN | 7,580,000.00 | 1 JUN 2017 TILL 11 FEB 2019 |

Table 1.2 List of Completed Projects

# CHAPTER 3.0

## 3.1 Introduction to Case Study

The project studied is PROPOSED CONSTRUCTION AND COMPLETION OF 168 UNITS DOUBLE STOREY LINK HOUSE TYPE 1 AND 1 UNIT OF TNB SUBSTATION WITH INFRASTRUCTURE WORKS ON PART LOT 368, PHASE EV5A ELMINA WEST, SEKSYEN U15,40170 SHAH ALAM, SELANGOR DARUL EHSAN. Several professionals parties are involve such as Sime Darby Elmina Development S/B as client and consultants, Seniwisma Architect Engineer S/B as architect, Ghazali & Associates Sdn. Bhd as structural engineer, PE Associates Sdn. Bhd as m&e engineer, Hashim Dan Lim Sdn. Bhd. as quantity surveyor, Arkitek Urbanisma Sdn Bhd as Landscape Engineer and Kitacon Sdn Bhd as Main Contractor. Besides, there are several subcontractors parties involve in this project such as Ningbo Construction Sdn Bhd as carpenter, barbender, mason and infrastructure, Tewara Sdn Bhd for electrical services, Bumix Global Sdn Bhd for plumbing services, Midwest Green Sdn Bhd for alarm services and KL Elite Letrik Sdn Bhd for aircond services.

The contract sum for this project is RM56,282,957.53 with a contract period for all units is 34 months and contract period for mock up units is 8 months. The project defects liability period is 24 months. Liquidated of ascertained damages (LAD) for main building is RM35,000 per day, advance units for RM5000 per day, TNB substation for RM1000 per day and Guard House for RM1000 per day. The project date of pre-site posession is on 22$^{nd}$ March 2019. The date of completion for overall units is on 4$^{th}$ February 2022 and for mock up units on 4$^{th}$ December 2019. This project is located at Elmina West, Seksyen U15 Shah Alam which area is surrounded by residential areas, shop lots, recreational parks and walkway. Several activities for civil and structure works has been carried out on this site such as backfilling earth ground slab, installation formwork and rebar, laying brickworks, excavation, water proofing application, dismantle formworks, concreting works, anti-termite application works, barbending and more. As for focus activities in mechanical and electrical works that has been carried out on this site are installation for plumbing and electrical underground pipes, installation ppr pipe and drain pipes, installation pipes and conduit

on bricks, installation of sanitary pipes and more. These activities are recorded in daily site diary of each supervisors on this site.


Figure 3: Location of Site Elmina Valley 5 via Satellite

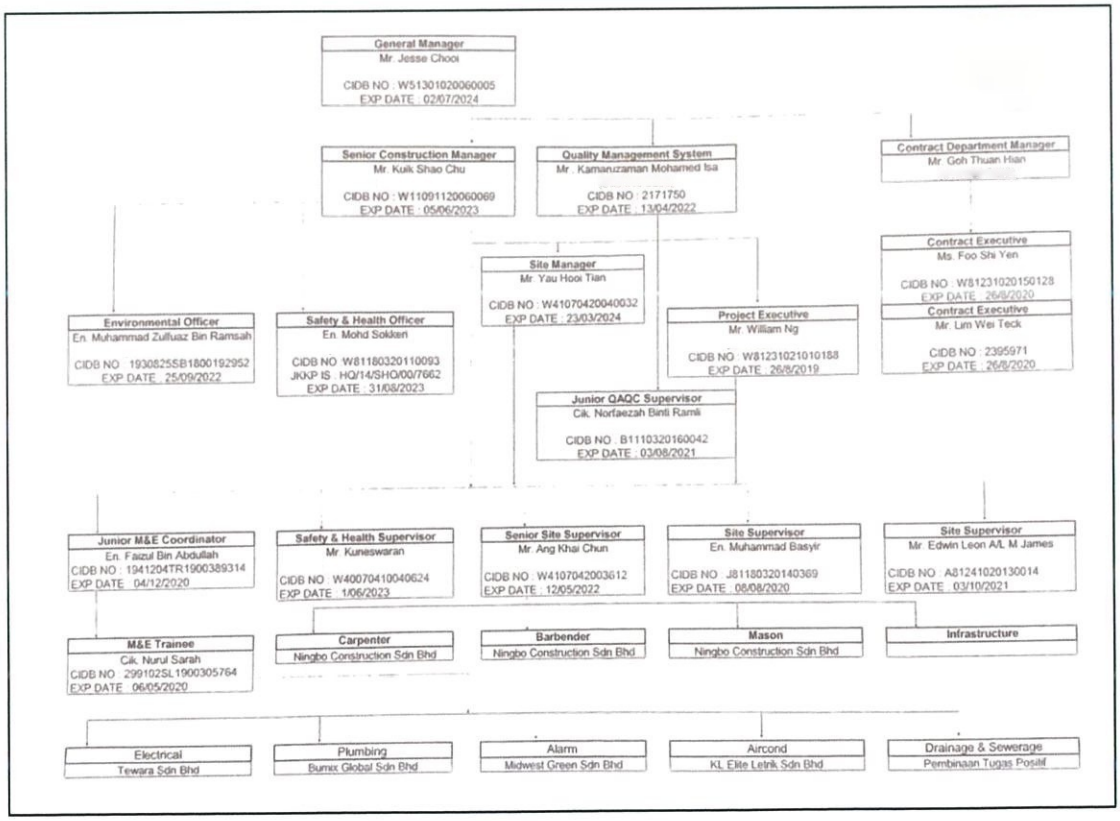



Figure 4 Site Organization Chart

Figure 5 represents site layout on EV5A. EV5A consists of 18 blocks in total. Main building are referred as mock up block which is Block 7. Block 7 consists of 2 units as sample units. Date of completion of sample units is on 4th December 2019 but it has been delayed for 9 days due to unfit weather for workers to work. Block 7 are now in architectural progress work. Block 8 until Block 14 are now in progress on brickworks and cables install in conduit. Block 15 until Block 18 are now in progress on first floor slab. Installing conduit routing for alarm and electrical services, sanitary, rainwater down pipe and stack pipe sleeve and aircond drain pipe. Block 3 until Block 6 are now in progress on ground slab which includes installation of aircond discharge outlet, cold water and PPR pressure test. Lastly for Block 1 and Block 2 are now in progress of backfilling earth on underground piping and underground piping installation.

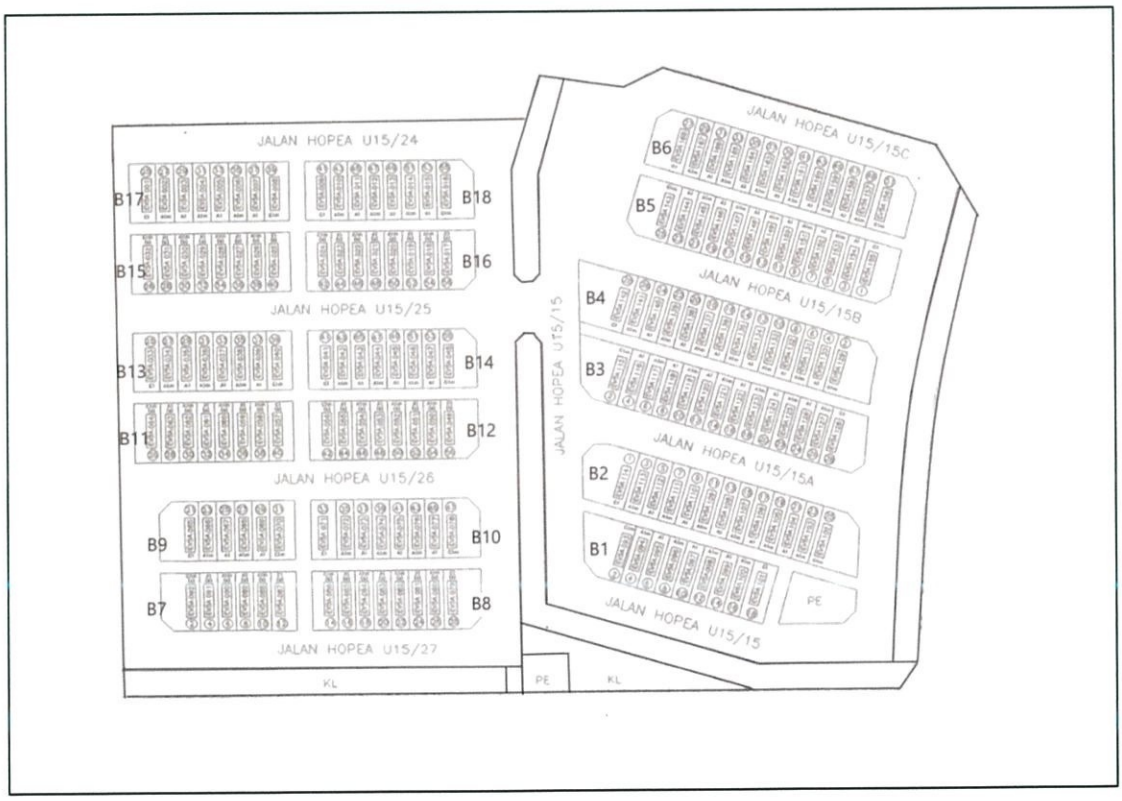



Figure 5 Layout EV5A

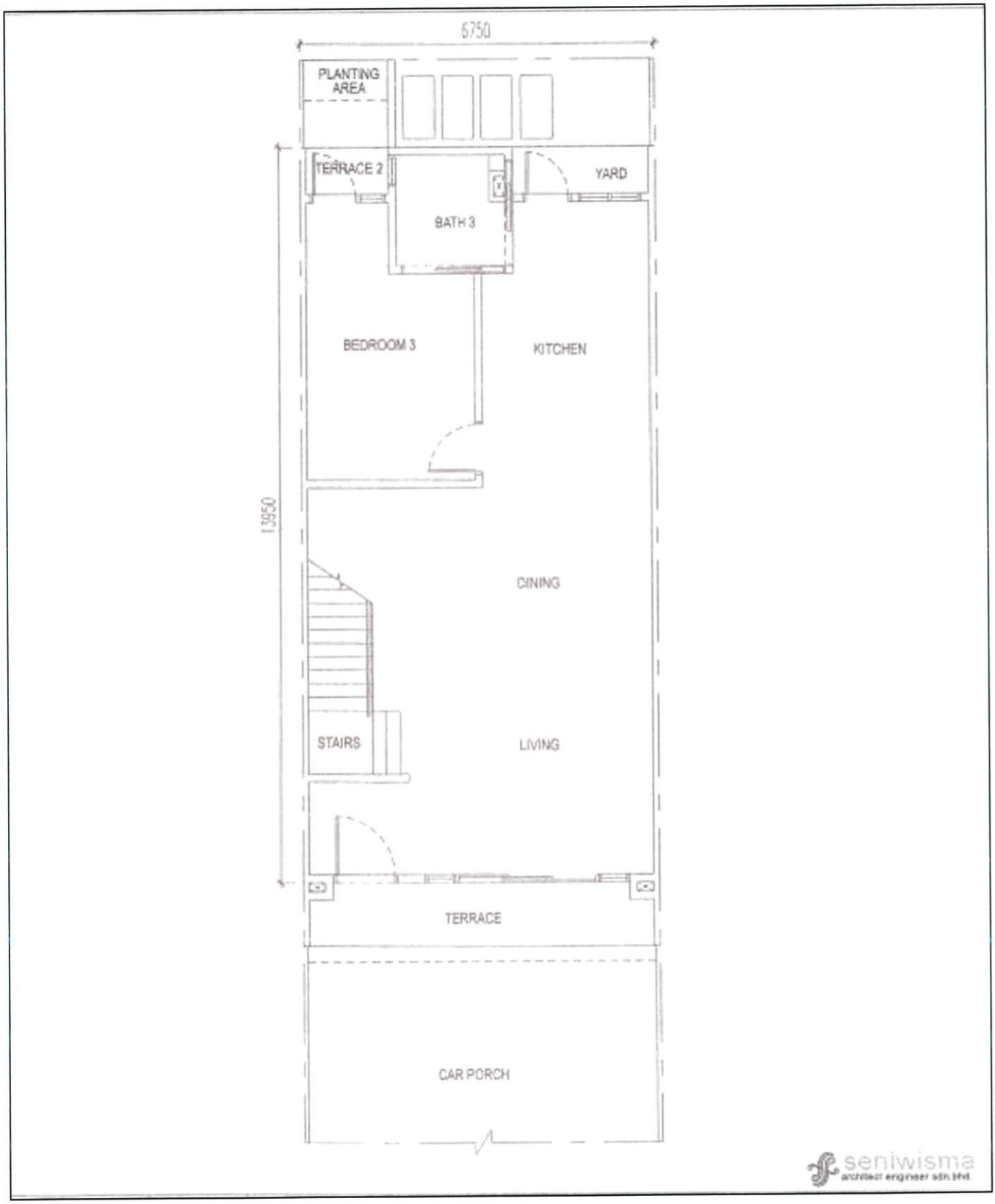



Figure 6 Ground Floor Plan

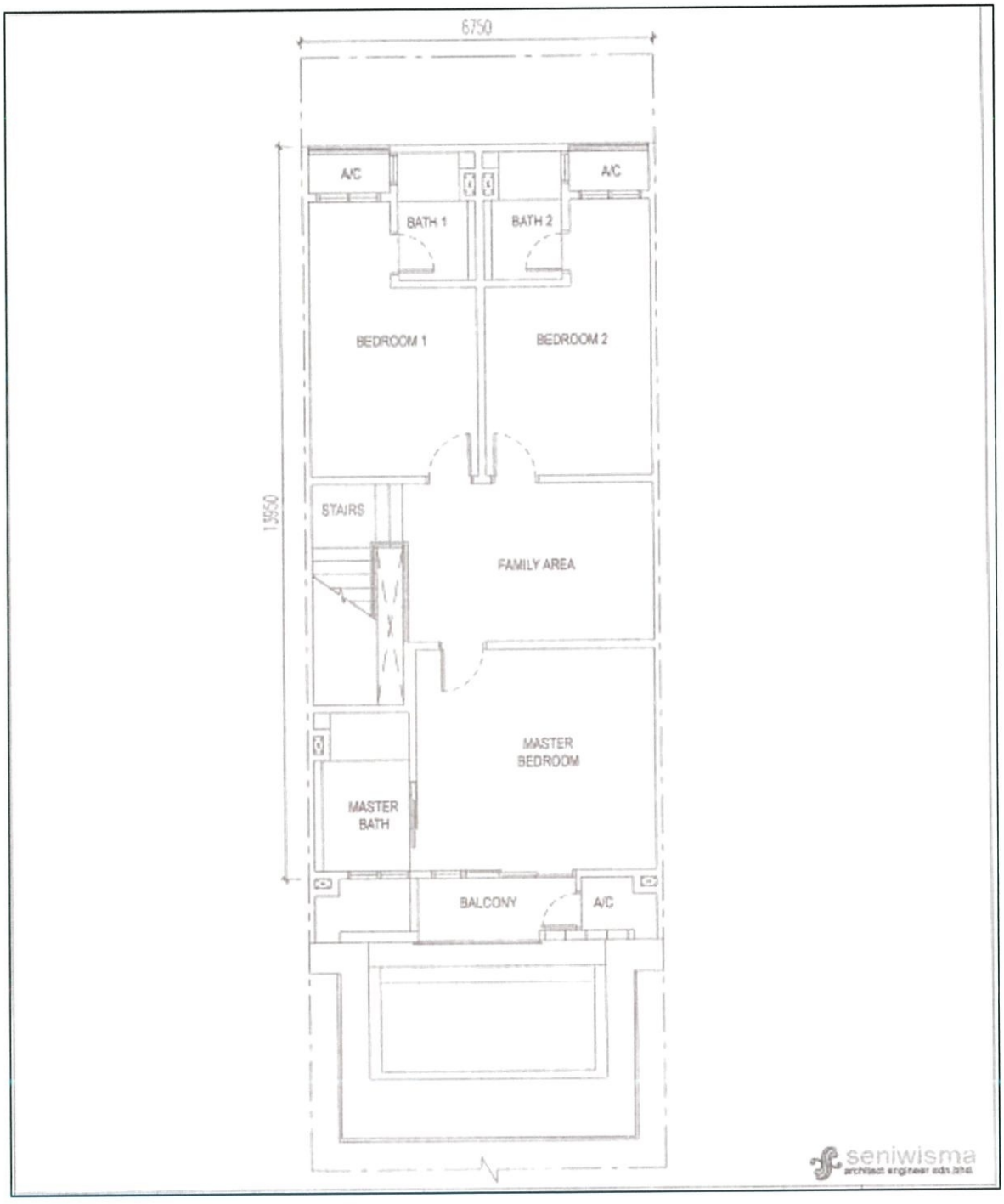



Figure 7 First Floor Plan


Figure 8 Front & Rear Elevations Plan

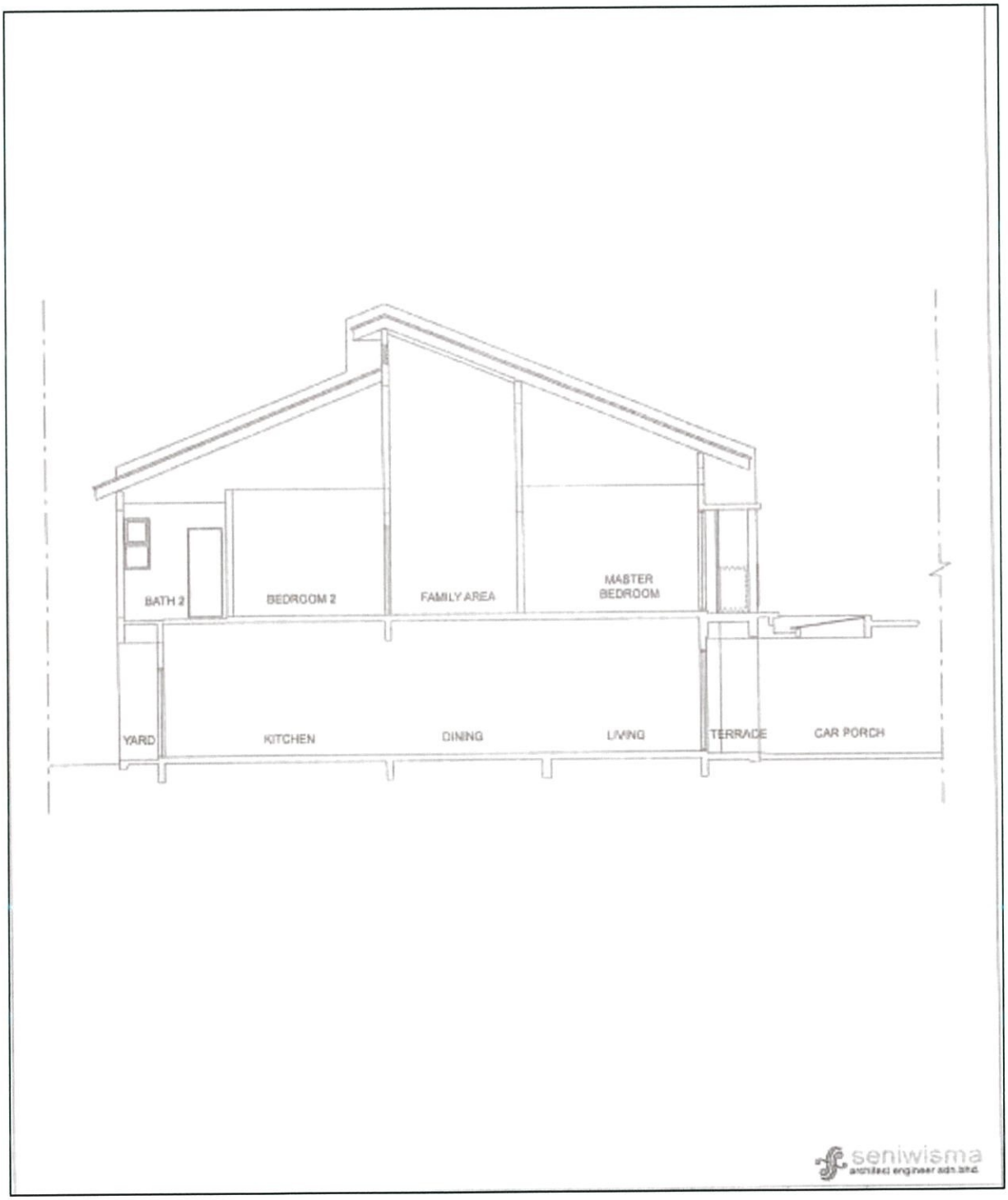



Figure 9 Section Plan

### 3.2 To identify the type of pipes used are approved type and according to specification

Identification of types, brands, sizes and more of pipes are an important elements before continue underground piping works. These matters of pipes are approved by clients and main contractor and according to specification from the catalogue. Underground piping consist of Sanitary Pipes, RWDP, Corrugated Electrical Pipe and Telephone pipe.

All sanitary piping are from PREMTEX Sanitary Ware Collection.

This brown coloured pipe (refer figure 10) or known as Water Closet Pipe are used for water closet in every bathroom. Type of pipe used for this wc pipe is BBB with a size of 100mm x 3.2mm PVC-U pipe. This wc pipe has SIRIM QAS Cert and qualification to use for underground piping as it can carry heavy loads without damaging the pipe.

Figure 10 Water Closet Pipe

This white coloured pipe placed next to the water closet pipe (refer figure 11) are known as Ventilation Pipe. The type for vent pipe used is BBB with a size of 56mm x 3.0mm PVC-U Pipe. This Vent Pipe has a SIRIM QAS Cert. Ventilation Pipe are used to release the bad odour from water closet.

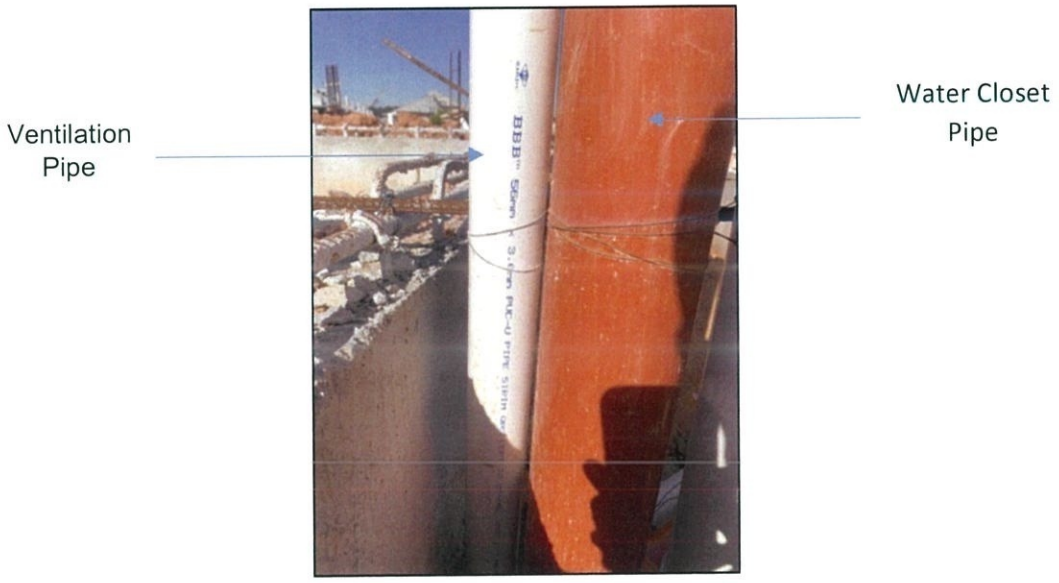



Figure 11 Ventilation Pipe

This white coloured pipe (refer figure 12) are placed on the front as Rainwater Down Pipe. The type for rainwater down pipe used is CHINLEAN with a size of 110m (W/T 2.50) PVC-U. This rainwater down pipe has a SIRIM Cert. Rainwater Down Pipe are used to convey wainwater from gutter.

Figure 12 Rainwater Down Pipe

This white coloured pipe (refer Figure 13) are called Floor Trap. The type of Floor Trap used for this project is BBB with a size of 110mm x 3.2mm. This Floor Trap pipe has a SIRIM QAS CERT. Floor trap are used to prevent ingress of foul air, insects and a vermin from sewers into the building and resists the spread of diseases. Traps are act as water seal. All floor trap pipes are connected to gully trap that is provided outside of the building. For this project, gully trap collects water from sink, bathroom, washing machine, shower, basin and floor trap.

Figure 13 Floor Trap

This red coloured pipe (refer Figure 14) are known as Corrugated Electrical Pipe. This corrugated electrical pipe are from BINAPLASTIC INDUSTRIES SDN BHD. HDPE Double Wall Corrugated Pipes with a normal diameter of 100mm with a standard length 6m/50m while 150mm with 6m/30m. This corrugated pipes has a SIRIM QAS CERT. HDPE Corrugated Electrical Pipes are preferred in many applications because of its superior mechanical properties and cost-effective handling characteristics such as structucal strength as it is a flexible pipe system that performs well in both high cover and low cover applications. Its toughness and flexibility enable it to withstands shifting soil condition. Secondly, abrasion resistance as for decades of real world testing have demonstrated PE's interior and exterior toughness. Thirdly, light weight as it is easier on handling, required less workers, reduce equipment and improve safety. Next, chemically inert as HDPE is highly resistant to corrosion and is immune to galvanic and electromechanical reaction. Besides, corrugated exterior adds strength to whilst smooth interior provides superior flow capacity characteristics. Lastly, simple installation as the pipes are easily joined with double connection sleeves optionally sand proof or water proof by using special profiled seals.

Figure 14 Corrugated Electrical Pipe

This blue black coloured pipe (refer Figure 15) are known as Telephone Pipe. This telephone pipe are from CEW SIN PLASTIC PIPE SDN BHD. The type used for this pipe is BBB with a size 50mm x 3.7mm SDR 13.6 ELLENE H5211PC. The underground telecommunication cables pipe is recommended by the telecommunication authorities for use in the ducting of telephone and electrical cables. The Pipes is chosen as they provide good protection to the cables and their di-electric properties and they have the ability to resist corrosion, ease in handling storage and installation. Ducting use for high speed broadband, CCTV and Fiber Optic. This telecommunication cables are approved by Telekom Malaysia Berhad (TNB)

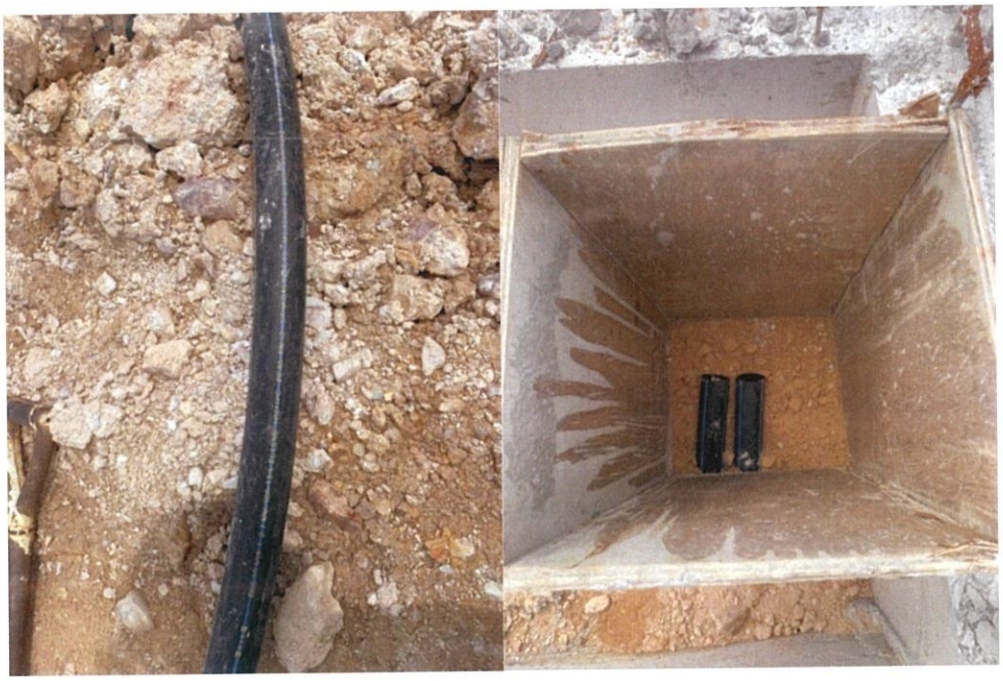


Figure 15 Telephone Pipe

All material approval, SIRIM QAS CERT and catalogue are confidential for the company to be referred as appendix. However, project manager has agreed to let certain information of materials and certificates to be exposed in writing.

### 3.3 To ensure all pipes installation are inspected and tested as per requirement

All pipes are installed according to the drawings (refer Figure 16). There are one sink,basin,shower,water closet on ground floor. There are six floor trap total. Each sink, basin, shower and washing machine are connected to floor trap. Floor trap convey water to gully trap. Water closet are directly to sump.

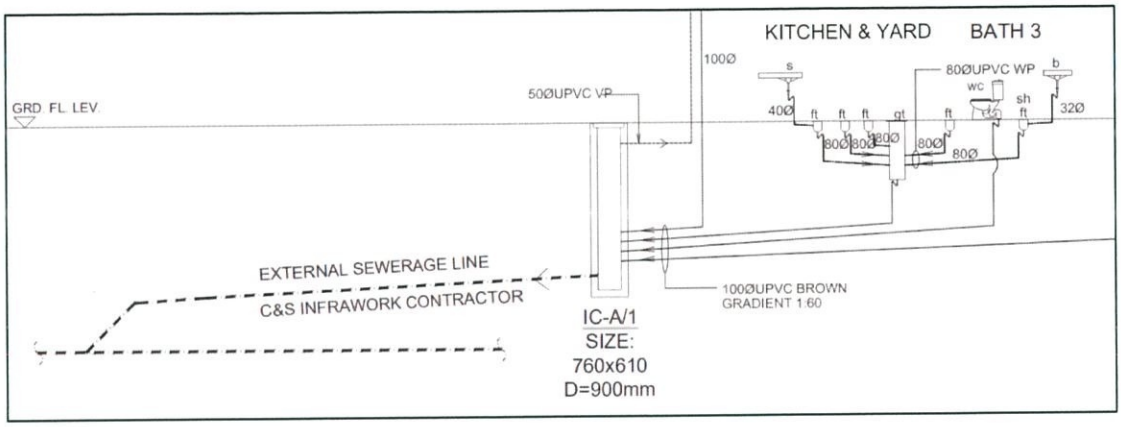



Figure 16 Typical Schematic Diagram For Type A (Standard) - Corner

All pipes are inspected and tested as per drawing. Underground Piping Installation are inspected by Junior M&E Coordinator on site. Characteristics that satisfied the coordinator are pipes are installed according to the drawing, pipes are in a good condition, pipes can go through flow test without having problems and pipes are installed with a true dimension.

NOTES

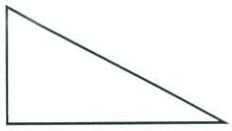
1. ALL SOIL PIPE BELOW 100mmø AND ABOVE GROUND SHALL BE UPVC (WHITE) TO BS 4514 & BS 5255.
2. ALL SOIL PIPE 100mmø BELOW GROUND SHALL BE UPVC (BROWN) TO BS 4660: 1973. PIPE SIZES
3. EXTERNAL MAIN LINE MANHOLE & PIPE WORK RECTICULATION TO BE REFERED TO CIVIL & STRUCTURE ENGINEER'S DRAWINGS.
4. ALL LEVELS SHOWN ARE IN METRIC
5. SINK & BASIN SHALL BE C/W BOTTLE TRAP
6. SANITARY PLUMBING PIPNG SHALL BE INSTALLED AT UNIFORM GRADE AS INDICATED IN THE FOLLOWING SCHEDULE:
   - 80ømm AND BELOW = GRADIENT 1:40
   - 100ømm = GRADIENT 1:60
   - 150ømm = GRADIENT 1:100
7. ANTI-SIFON PIPE IS PROVIDED AT EVERY SANITARY FITTING.
8. CLEANING EYES FOR SERVICING SHALL BE PROVIDED WHEREVER NECESSARY.

Figure 17 Notes in Schematic Diagram

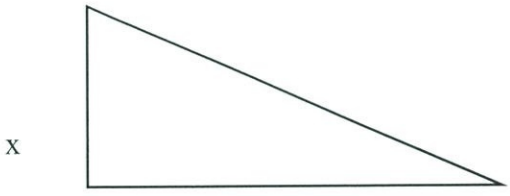
Each of every pipes has its own gradient. As in Figure 17, 80mm diameter represents 3 inches pipe with a gradient 1:40 that is used for vent pipe and floor trap after connected to booster. For 100mm diameter or 4 inches pipe with a gradient of 1:60 are used by water closet pipe and floor trap. For 150mm diameter with a gradient of 1:100 are used by……

In order to install pipes with a correct gradient especially for water closet as its gradient affects a lot for the water flow, some calculation has been taken to install the pipes according to the gradient given. Calculation are as below:

1:60



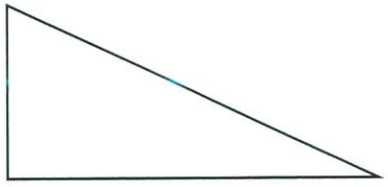

1:14000 (measure water closet pipe using 1:100 scale in drawing)




$$x/1 = 14000/60$$

$$x = 250$$

250 : 14000




All pipes are inspected by checking all pipes are installed correctly with a correct dimensions, gradient and amount.

Figure 18 Whole unit for Underground Piping

Figure 18 shows Floor Trap with 4 inches of pipe are installed. It is connected to a 3 inches floor trap pipe with a booster. Boosters are act to boost the flow of fluids. Fluids are convey to gully trap faster with a booster.

Figure 19 Floor Trap Installed

Figure 19 shows Water closet are installed with a size of 4 inches pipe. It is installed as gradient 1:60. All water closet will go directly to sump.

Figure 20 Water Closet Installed

Figure 20 shows a Gully trap are built with clay bricks around as its box and are cement to cover the whole gully trap. All floor traps will directly connected to gully trap. Gully trap received piped wastewater from inside the building. Gully trap has a water to seal to prevent foul odour of the sewer before reaching the surface and vent pipe that allows fresh air in.

Figure 21 Gully Trap

Corrugated Electrical Pipe are installed. The pipe are connected to TNB pipe which is PN10 as show in Figure 22.

Figure 22 Corrugated Electrical Pipe Installed

Rainwater down pipe are installed outside the building. It is connected from the gutter at the roof.

Figure 23 Rainwater Down Pipe

Telephone pipe are installed in box sub.

Figure 24 Telephone Pipe Installed

In order to get ideal distance between pipes and ground beams, all pipes are measured by coordinators for inspection.

Figure 25 Inspect Distance of Pipes

Before flow test are excellently tested, RFI or Request For Inspection (refer appendix) are made by coordinators and submited to C.O.W or Clerk Of Work as permission to carry a flow test.

After all pipes are installed, coordinators and workers tested pipe flow test. To ensure pipes convey fluids without having problems. Two balls are used to implement the flow test and a basin of water to flow the ball to sump.

Figure 26 Flow Test

Figure 27 Flow Test Result

## 3.4 Problems and Solutions of Underground Piping Installation

Problems occurred during underground piping installation are less than expected. Usually, underground piping installation has less problems to face compared to other grounds installation.

Few problems are obtained during underground piping installation such as pipes are installed incorrectly as it is not installed according to gradient given. This will make the flow of water slower or failure to convey fluids. Fluids are stucked in the middle of pipes. Solutions has been taken and it is the only way to fix the problem. Coordinator ordered the workers to re-installed the pipes with a correct gradient. As this solution has been made, water flow were excellent.

Next, pipe leaking are the most to happen in the site during underground piping installation. This is causes by careless mistakes by workers who work roughly towards the pipes. Pipes can leak due to steel bars installation that damages the pipes. There are also other causes such as mistakes before accepting delivery orders by not checking the pipes are in a good condition. Pipes leakage will make pipe flow test are not in a good result. Water will not flow well throught pipes. Solution taken is to re-order the pipes to install the new pipe. This will make the company a bit loss for ordering new pipes to exchange the damages.

# CHAPTER 4.0

# CONCLUSION

## 4.1 Conclusion

In conclusion, underground piping is an important element in every mechanical and electrical works. It plays an important role because it acts as a transport to convey gases, fluids or solids to another pipes or outside the building. Any faults will result the whole piping works.

Each pipes consists different type of pipes design. This is because of it is design to carry loads of structure and soil bearing capacity that built on it. Every pipes are located perfectly in different position. Types of pipes used in this study has different sizes with different functions.

As for this report, this project used a suitable design of underground piping as it is approved by engineers and is installed according to the given specification and is expected to last a lifetime.

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# APPENDICES