DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

BUILDING MAINTENANCE

PROJECT AT MENARA TABUNG HAJI, JB

Prepared by:

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

DECEMBER 2018

It is recommended that the report of this practical training provided

by

Zhimia Binti Muhammad

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entitled

Building Maintenance Project At Menara Tabung Haji, JB

be accepted in partial fulfillment of the requirement for obtaining the Diploma In Building.

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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 THUB Sdn Bhd for duration of 14 weeks starting from 3rd September 2018 and ended on 7th December 2018. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfilment of the requirements for obtaining the Diploma in Building.

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Date : 18th December 2018

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CHAPTER 1.0

INTRODUCTION

1.1 Background and Scope of Study

Building maintenance indicate that increasing pressure to extend the useful life of a building without compromising the objectives of maintenance has led to an increasing interest in methods of integrated maintenance management. (Ong, 1997). Building maintenance develops a new approach to selecting an appropriate maintenance strategy which depends on controlling the consequences of failure of every item in the building and determining a suitable strategy for each one in order as a substitute to budget_driven maintenance strategies. (Lateef, 2009). It also analyses the relative advantages and disadvantages of corrective, preventive and condition_based strategy. Therefore, it advocates a novel, systematic approach to the management of building maintenance. Hence, it suggests this method to managers to reduce the cost of maintenance while preserving the safety, health and satisfaction of the user. (Horner, El-Haram and Munns, 1997)

Building is some to extent determined by attainability of material and skilled operatives, therefore local, regional and national factor will also be responsible for some variation. Supplementary study material and detail can be obtained from professional journals, legislative paper, manufactures product literature, the many cross-references in the text and attending exhibits and seminars. The most valuable learning resource is observing and monitoring construction in progress (Chudley, 1982)

Therefore, it is essential to provide building maintenance for residential building especially in Johor area in order to keep develops more building for citizen in future. This study was conducted to understand the maintenance in building. It focuses on the building conditions in Menara TH Johor Bahru. The scope is

divided into three main disciplines which are civil and structure, electric and mechanical. Hence, this study aims to describe the problem in the building. This report shows information about the execution of building maintenance of a TH building in Johor Bahru. This stage involved in planning and development activities associated with Scope Building Condition Assessment include the following:

a. The basic structure of the building - the only system that is exposed only
b. Roof System
c. Building Facade
d. Internal system - walls, doors, etc.
e. Water supply system - pipes, tanks, pumps, etc.
f. Electrical system - low voltage, high voltage, etc.
g. Mechanical system - air conditioners, etc.
h. Lift system
i. Fire Alarm System

1.2 Objectives

There are a few objectives to be obtained in providing this Practical Training Report. The objectives are as follow:

1.2.1 To investigate the types of building maintenance.

1.2.2. To identify the effects of damage in building.

1.3 Methods of study

This study is arranged in a systematic sequence to ensure good quality of the study and its objectives can be achieved. The sequence of study is as follows:

i. 'Walk thru inspection'

Infrared Thermography method is used to inspect the physical and equipment of building. In carrying out the inspection, the method used is a visual inspection performed on physical exterior and interior of the building involved to identify any defects / damages and causes of these problems.

ii. Observation

This observation method is done during practical training directly by site visit. The information collected based on what happen at site building guided by site supervisor. The technology as camera and cell phone was used to record any important information such as progressing of maintenance, equipment and machineries that used while maintenance.

iii. Interview methods

Other methods that can be used to collect data for this report are by interview. Interview was conducted to get more information about this project by site supervisor and this project involve such as interviewing engineer, technical assistant, inspector of work and project manager.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of company

TH Universal Builders Sdn. Bhd. is a premiere Islamic financial institution in Malaysia, a statutory body setup by the Government of Malaysia in 1963 called Lembaga Tabung Haji. Lembaga Tabung Haji wholly owned an integrated property, project development and facilities management group. It was registered under number 225709-A with paid-up capital RM 20, 000,000.00 and authorized capital RM 50,000 000.00 .The company was restructure as a civil and structure contracting. The company is a well experienced in every field and has completed numerous jobs for both public and private sectors.

The company's directors are En. Nik Badrul Hisham Bin Nik Hassan which hold 100% of shares. The management of the company is headed by En. Nadzri Bin Mohd Daud, assisted by Nur Adlan Taib. The company also employs several other management and field staff with experiences varying from technical aspects to implementations. At present the company provided the contracting sector's, supplies other related materials landscaping related activities.

TH Universal Builders Sdn. Bhd is a company which cares about the quality. Now, there are lot of big project constructed by TH Universal Builders Sdn. Bhd such as Menara TH Tun Razak,Menara TH Perdana, Menara TH Damansara and Menara TH Platinum. The company also has completed infrastructure projects in excess of RM1 billion in value and has expanded into asset and facilities management sector within two years. Based on the achievement and experience, TH Universal Builders Sdn. Bhd will be able to compete with others company to be successful in future.

2.2 Company profile

Figure 2.1 TH Universal Builders Sdn.Bhd logo and symbols

Table 2.1 TH Universal Builders Sdn. Bhd

Company Name :	TH Universal Builders Sdn. Bhd.
Company Registration :	225709-A
Year of Incorporation :	01 October 1991
Core Business :	Integrated property & Facility Management Services
Registered Address :	Level 20, Bangunan TH Selborn 153, Jalan Tun Razak 50400 Kuala Lumpur Malaysia
Authorized Capital :	RM50,000,000.00
Paid-Up Capital :	RM20,000,000.00
Shareholder :	TH Properties Sdn Bhd. (100%)
Board of Directors :	TH Properties Sdn. Bhd, - 3 representatives
Tel No. :	
Fax No. :	
Website :	www.th-properties.com

2.3 Organization chart

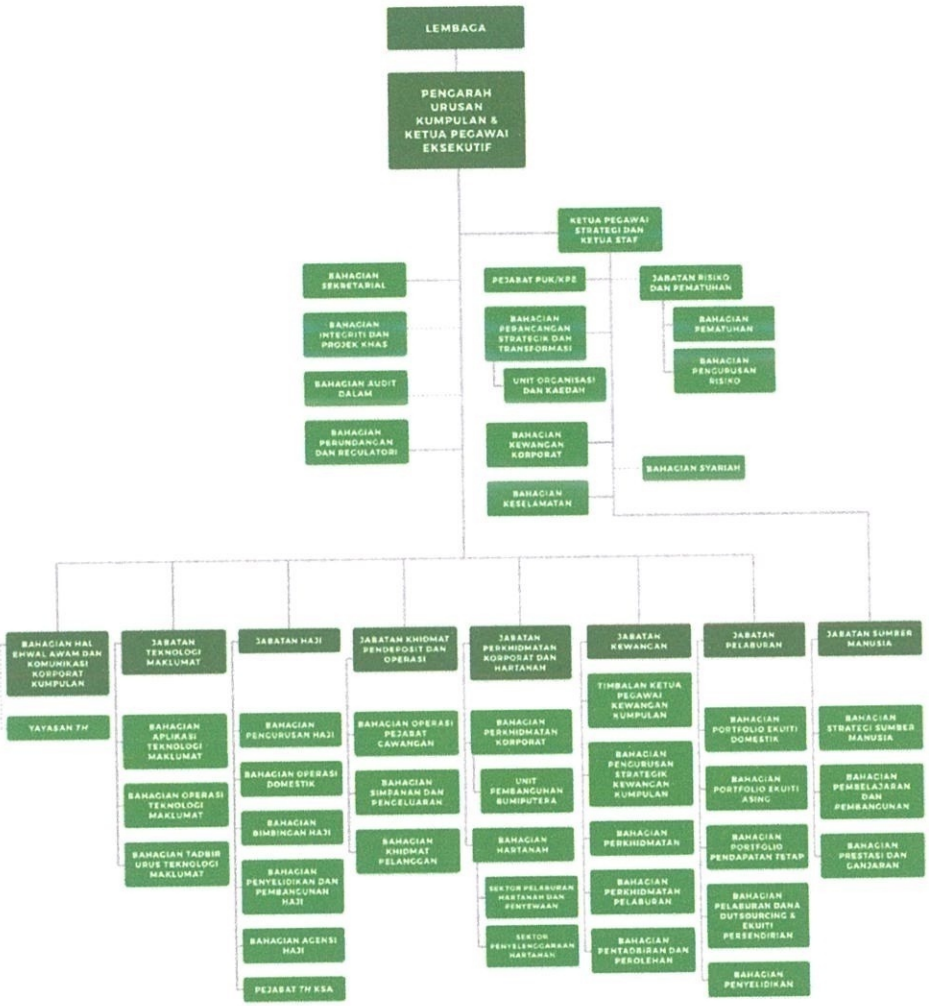


Figure 2.2 The figure shows the overall company organization chart

(Source: TH Universal Builders Sdn. Bhd.)

2.4 List of Project

TH Universal Builders construct a lot of project such as Menara TH Tun Razak,Menara TH Perdana, Menara TH Damansara and Menara TH Platinum. This company has more focus on facilities and accommodation.

2.4.1 Completed projects

Table 2.2 List of completed projects

No.	Contract name	Contract worth	Duration of contract	
			Start	End
1	Facility Management Services For TH Hotel & Convention Centre Kuala Nerus, Terengganu	1,654,308.00	1/5/2015	31/7/2017
2	Facility Management Services For TH Hotel & Convention Centre Alor Setar	1,427,904.00	1/5/2015	31/7/2017

2.4.2 Project in progress

Table 2.3 List of project in progress

No	Contract name	Contract worth	Duration of contract		Name and owner's address
			Starts	Ends	
	Facility Management Services For Menara TH Tun Razak (Headquarters Of Lembaga Tabung Haji)	22,183,992.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
	Facility Management Services For Menara TH Perdana	18,969,048.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
3	Facility Management Services For Menara TH Selborn	16,248,240.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji

	Facility Management Services For Menara TH Johor Bahru, Johor	14,008,536.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
	Facility Management Services For Menara TH Uptown 3	12,097,152.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
	Facility Management Services For Menara TH Damansara (GLOMAC)	14,426,928.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
	Perkhidmatan Pengurusan Fasiliti Bersepadu Bagi Kawasan Di Sewa Di Kompleks Islam Putrajaya (YADIM)	260,931.09	1/2/2017	31/12/2018	YAYASAN DAKWAH ISLAMIAH MALAYSIA Aras 4, Blok D, Kompleks Islam Putrajaya, Presint 3
	Perkhidmatan Pengurusan Fasiliti Bersepadu Bagi Kawasan Di Sewa Di Kompleks Islam Putrajaya (MAIWP)	62,500.00	1/12/2016	31/12/2018	MAJLIS AGAMA ISLAM WILAYAH PERSEKUTUAN Tingkat 7, Bangunan PERKIM, Jalan Ipoh, 51200 Kuala Lumpur

	Perkhidmatan Pengurusan Fasiliti Bersepadu Bagi Kawasan Di Sewa Di Kompleks Islam Putrajaya (YAYASAN TAQWA)	45,050.00	1/8/2017	31/12/2018	YAYASAN TAQWA Aras 4, Blok D, Kompleks Islam Putrajaya, Presint 3
)	Facility Management Services For Menara Tabung Haji (Platinum Park)	20,556,861.04	7/10/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
1	Kompleks Islam Putrajaya	16,005,715.92	1/1/2016	31/12/2018	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
2	Facility Management And Hospitality Rest House At TH Cameron Highland	467,512.50	1/4/2017	31/12/2018	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
3	Portfolio Manager For Abraj Sdn. Bhd.	1,600,000.00	1/5/2017	30/4/2019	ABRAJ SDN. BHD. Unit 40-1, Menara TH Perdana, Jalan Sultan Ismail, 50250 Kuala Lumpur

4	Building Manager For Abraj Sdn. Bhd.	132,338.38	1/5/2017	30/4/2019	ABRAJ SDN. BHD. Unit 40-1, Menara TH Perdana, Jalan Sultan Ismail, 50250 Kuala Lumpur
5	Facility Management At TH Hotel Bayan Lepas	10,546,560.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
4	Facility Management At TH Hotel Alor Setar	13,120,848.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
5	Facility Management At TH Hotel Kelana Jaya	10,072,584.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji

6	Facility Management At TH Hotel Kuala Nerus	12,410,496.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
6	Facility Management At TH Hotel Kota Kinabalu	13,195,296.00	1/7/2017	30/6/2023	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
7	Facility Management Services For Menara TH Bangsar	7,511,508.00	1/1/2016	31/12/2018	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji
8	Facility Management And Hospitality Rest House At Puteri Harbour, Johor	1,060,100.00	1/2/2018	31/12/2019	LEMBAGA TABUNG HAJI Tuan Haji Md Ridza Md Zain Pengurus Besar Bahagian Penyelenggaraan Hartanah Lantai 36, Lembaga Tabung Haji

CHAPTER 3.0

CASE STUDY OF TH JOHOR BAHRU

3.1 Introduction to Case Study

The project carried out in the practical training was building condition checking at TH Johor Bahru. Figure 3.1 shows the location plan. It was located in Jalan Ayer Molek, JB. TH Johor Bahru consists of 10 levels office building + 6 levels parking + 4 levels roof level + 1 level stall and a prayer room. Each office floor is checked for maintenance purpose.

The project starts from 1st July 2017 and the expected completion date is on 30th June 2023. There are several parties involved in this project which includes Amir Bin Ayub as the head audit, Zainuddin Aswaddalai as the certified thermographer, Khairul Afiq Zakaria took part in electric work, Jalaludin Bin Mohamad, in mechanical jobs and Shahrul Anuar Bin Safuddin in civil works. It is stated in the site organization chart in the Figure 3.2.

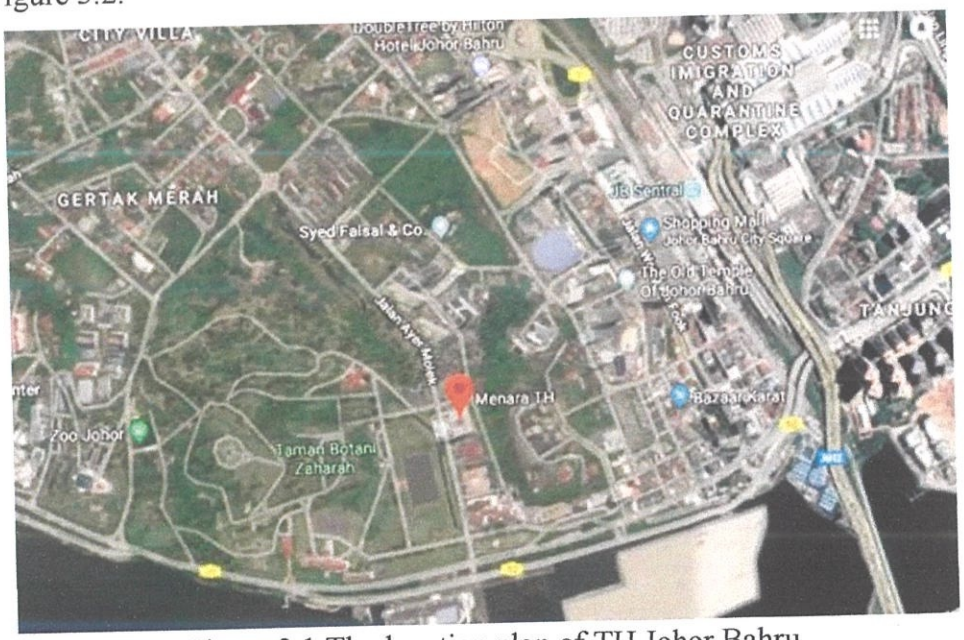


Figure 3.1 The location plan of TH Johor Bahru

(Source: TH Universal Builders Sdn. Bhd.)

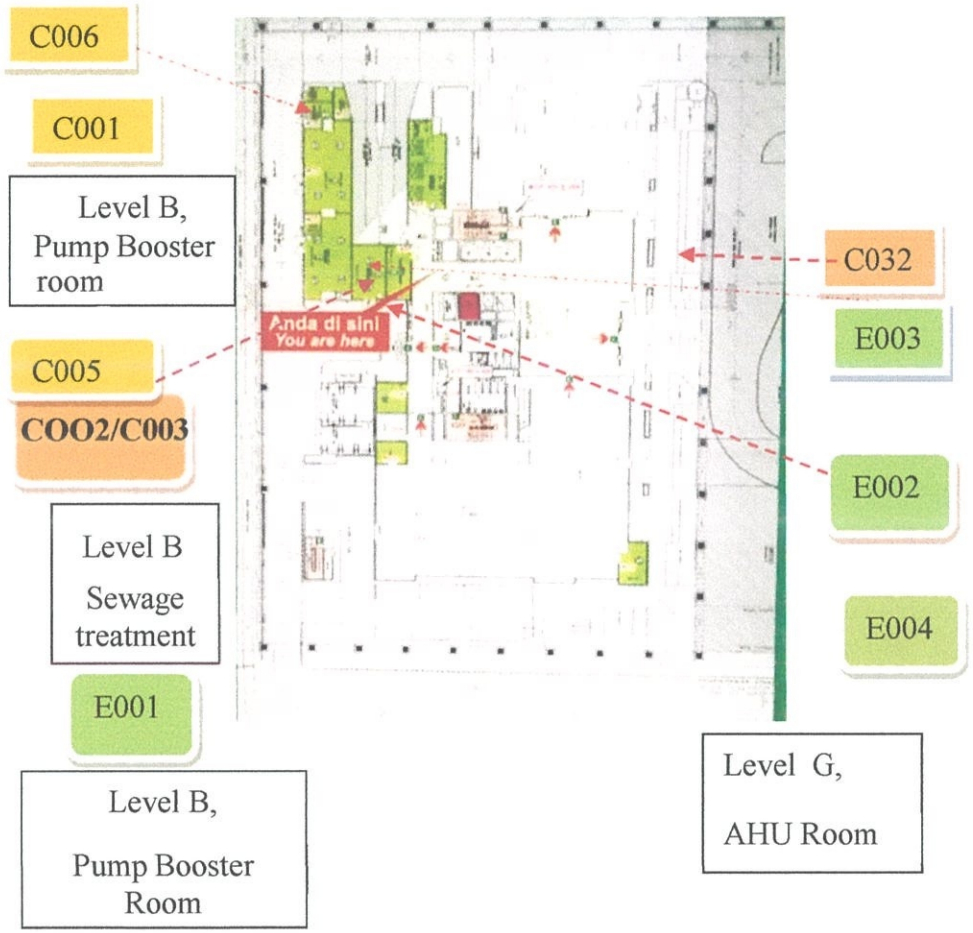
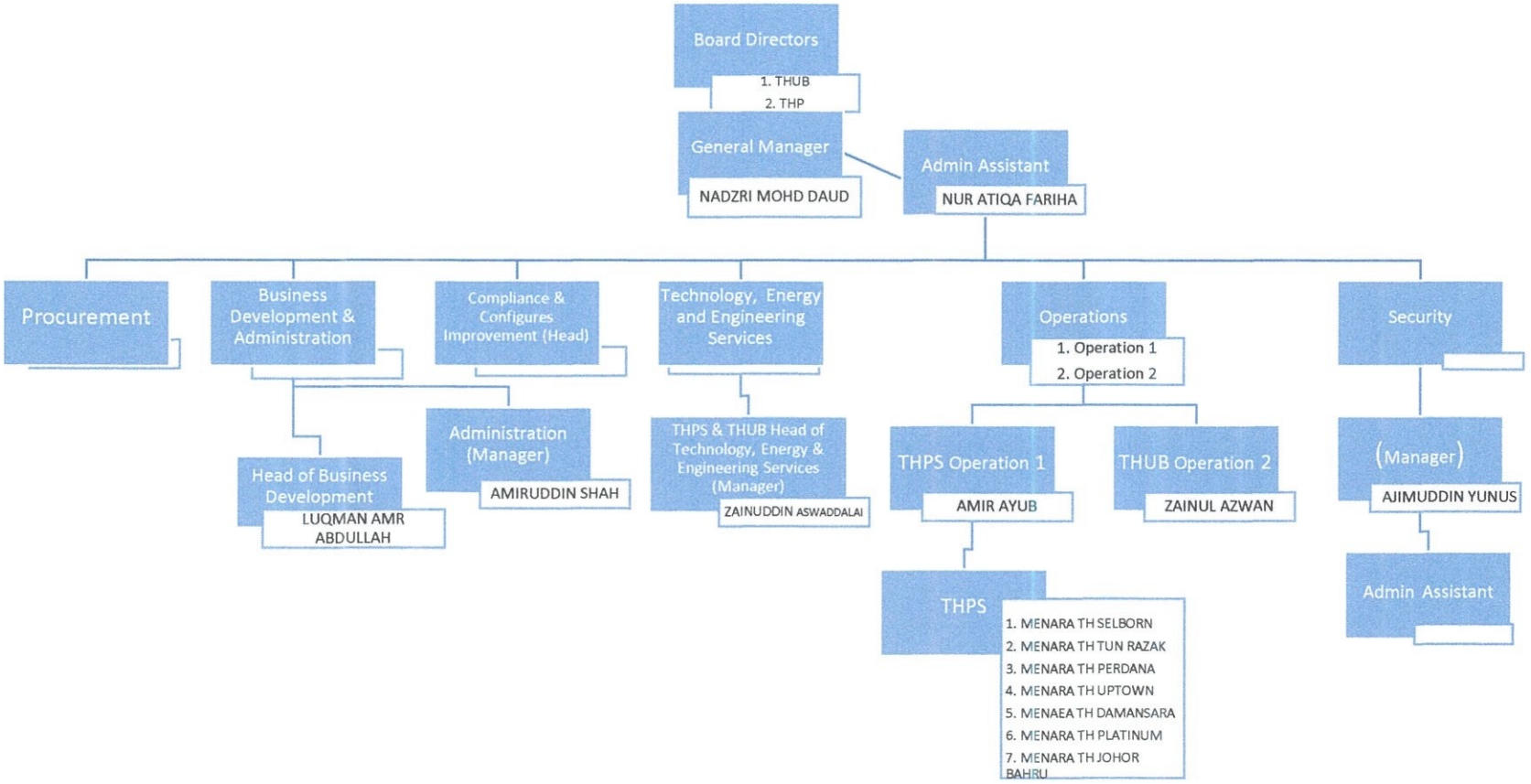


Figure 3.2 This figures shows floor sketch at level G

For this case study, the focus will be on the building defects in civil, mechanical and electrical. The figure above shows the maintenance done at level G. In carrying out the inspection, the method used is a visual inspection performed on physical exterior and interior of the building involved to identify any defects or damages and causes of these problems. Infrared Thermography method is used to inspect the physical and equipment of building.

Figure 3.3 Organization chart of site at TH Universal Builders Sdn. Bhd.

(Source: TH Universal Builders Sdn. Bhd.)

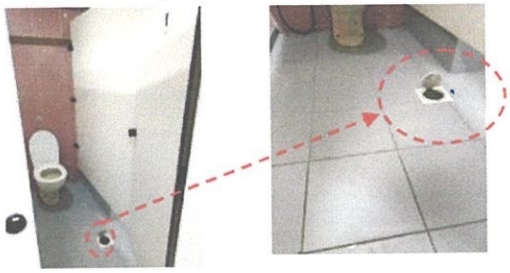


3.2 The types of building defect.

There are three types of building maintenance involve in the study. There are civil, mechanical and engineering.

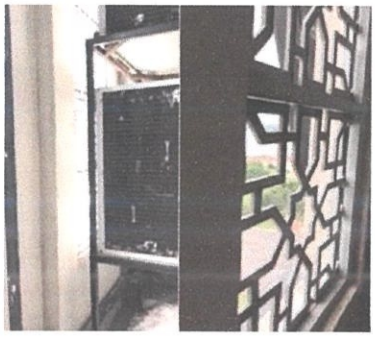
CIVIL

No	Damage explanation	Location
1	 Photo 3. 1 Joint Pipe No.1 & No.2 rusty. Rust happens when there is presence of oxygen and moisture, pipes are subjected causes the metal to oxidize. Rust creates friction inside the metal joints and makes it impossible to turn.	Level B, ST2 Pump Booster Room

2	Photo 3.2. Clogged floor trap  Most bathroom drain clogs when dirt, skin flakes, and especially hair binds to soap scum on the walls of drain pipes. Over time, this gunk accumulates and reduces water flow.	
	Photo 3.3. Leaking (blue) pipe  This may indicate there is a problem with the float valve in the leaking pipe. The float valve is usually a plastic ball at the end of a metal arm in the tank that's usually found in the loft. It controls the water level of the tank and will cause your overflow pipe to leak if it's faulty.	Level 1B, Parking lot

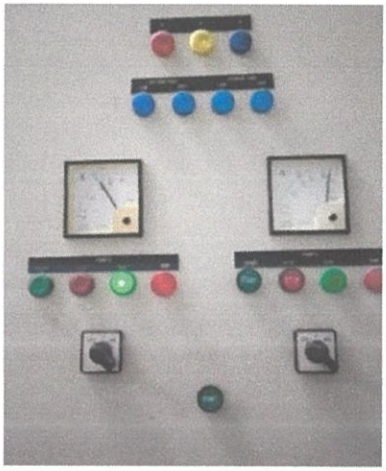
4	Photo 3.4. Leakage on floor  The problem is sewer backups can be caused by individual service lines being plugged by grease, waste, tree roots, and breaks in pipes or saturated ground.	Level 12, Riser water pipe flow and sewage
5	Photo 3.5. Whole tile popped up  Tile is a permeable material, so after some time, it can swell with high moisture absorption. Due to expansion, the pressure will cause the tile to pop up and therefore the tiles may get tent. Uneven sub floor also causes the tile to buckle.	Level 10, Corridor hallway

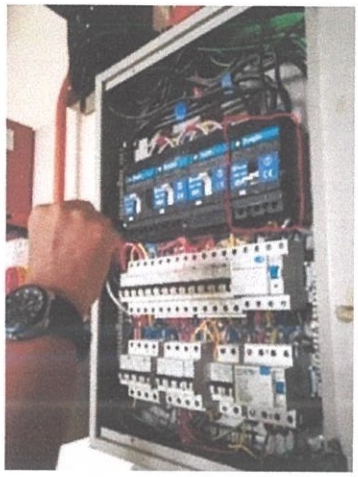
MECHANICAL

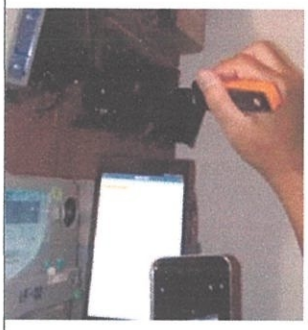
No	Damage Explanation	Location
1	Photo 3.6. Room condition is hot, it caused by heat hindered by 'signage'  Outside unit's job is to release that heat to the air outside. Poor insulation can have a big negative impact. System is longer than it should be necessary to heat and cool them, which can be expensive in the long run.	Level 17, Condenser room
2	Photo 3.7. Outdoor unit is broken (AHU-M-01-CU-01 & AHU-M-01-CU-02)  Air conditioner suddenly stops working, it can be something as simple as a blown fuse or tripped circuit breaker. It is important to note that many common problems with air conditioners can be caused by inadequate maintenance.	Level 18, outdoor spaces

3	Photo 3.8. Net damaged (SP/AC/7U-01& SP/AC/7U-02)  When the condenser overheats, all of the components of the AC system will begin to overheat until they eventually get hot enough to burn and emit an odor.	Level 7-U, Condenser room.

ELECTRICAL

No	Damage explanation	Location
1	Photo 3.9. Ammeter display faulty  An ammeter is an instrument used for measuring electric current in units of amperes. An ammeter must be connected in series with the path of the current being measured. Faulty ammeter can be detected when the needle stops working.	Level B, St2 Pump Booster Room

2	Photo 4.0 DB-FC2 Bottom cable faulty (*63A)  Low voltage fault or over load fault causes over current in the circuit. This over current causes huge heat loss in the circuit	Level 7-L, DB Cafe

3	Photo Cut off fuse (Red) faulty  Temp. reading for Cut off fuse : Red : 134.2 °c Yellow : 46.5 °c Blue : 36.5 °c Temp. reading for red phase cable : • Top : 74.9 °c • Bottom : 44.1 °c The bottom and top of cable must be at the same temperature and if it exceeds, the wire will become loose, soon it will cause faulty wire.	Level 17, Electric Riser (Lot 17-09)

3.3 The effects of damage in building and how to prevent it from reoccurring

A defect is a building flaw or design mistake that reduces the value of the building, and causes an unsafe condition. Most of the common problems associated with the frequency of maintenance and wrong installation. Firstly, pipe is rusty when metals containing iron, exposed to air and water will rust. Rust affects the metals in many ways. It affects the magnetic properties of a metal. There are many rust proofing methods that can prevent the formation of rust. Example, galvanizing is the method of applying a protective layer of zinc over iron or steel to prevent rusting. The zinc forms a barrier between the atmosphere and the metal underneath it. Though galvanized metal can get corroded eventually, it can still take decades. The corrosion resistance offered by the zinc depends on the thickness of the coating and the seriousness of the environment. Accurately predicting the life time of a coating is important for planning the budget and maintenance issues.

Moreover, a clogged drain can be a serious problem. The most obvious effect of a clogged drain is poor drainage. When drain is clogged, water will have a difficult time passing through the time, causing drainage to be slower than usual. Often times, more severe clogs will even cause water to travel back up your drain and bubble. Figure 3.2 shows the checking done after maintenance. However, a plunger is a tool that nearly every building has in advance. Photo 3.1 shows the authorities checking the drainage.

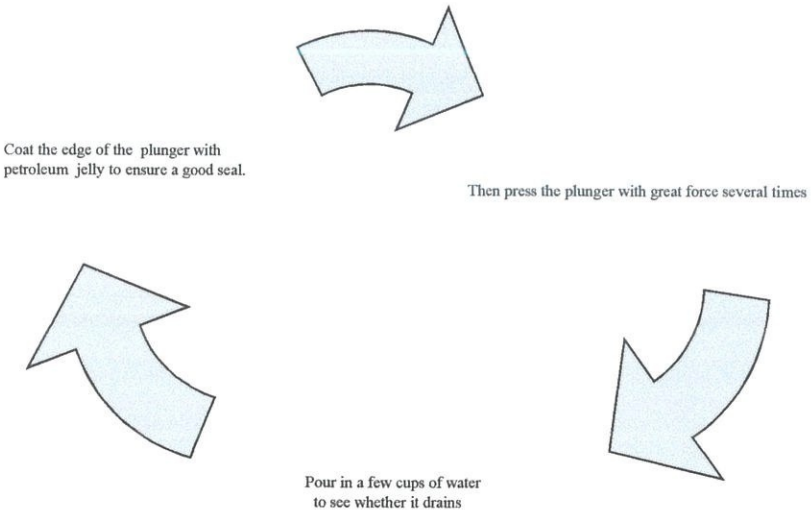


Photo 3. 2 The drainage is checked in the ladies' toilet no 2.

Next, leaking pipes will cause hard times if left unnoticed. If it being kept ignored, it will keep causing more damage to building. Photo 3.2 shows the metal pipe. Leaking pipes can cause water damage to many areas. Therefore, stop the leaking by shutting off the water valve to the pipe. Then, turn on the faucets to drain the water that is left in the pipes. Continue with wiping the pipe dry with a towel or cloth and allow it to air dry completely. Then, use a putty knife to put some epoxy on the leaking area. Epoxy is created by a mixture of two, the resin and the hardener. It is various in colour. Cover the leak with rubber after. Make sure it is completely covered before tighten a clamp down on the rubber and allow it to set for an hour. Furthermore, use water resistant tape to cover the rubber after it has dried. This will serve as double protection. Lastly, turn the water valve back on and make sure there is no leak.

Photo 3. 3 Pipe leaking at level 3

CHAPTER 4.0

4.1 Conclusion

Maintenance is the major thing that is practiced in the building. A proper use of the equipment is required to prevent from causing any problem in the future. A few preventive steps has been taken. One of the step taken is by galvanizing, it avoid oxidation from occurring in order to extend time of using and maintenance budget. In completing this report, the type of building defect and damaged effects has been explained in detail.

To detect problems of defects, laser and infrared thermography is used in the process. Camera and torch light are also required. In this process, camera is used to check how severe the condition is.

Therefore, Infrared thermograph can detect cold spot in pipes. Infrared represents heat, it will then convert the heat into temperature. This works well because they share the same wavelength.

Besides, laser pointer is linked to an application installed on an Android device called 'Smart Probes' and 'Thermography'. Bluetooth usage between these devices will show the reading by moving the laser pointer at the spot of defects.

To detect wear and tear in pipes, observation is done. Pipes show leaking that will cause water increasing on floors. It is important to be take serious on these problems. The maintenance building checking done should always be examined to ensure that the comfort of the working area is guaranteed and to provide comfort for building occupants.

REFERENCES

Horner, R.M.W., El- Haram, M.A., and Munns, A.K. (1997). Journal of Quality in Maintenance Engineering. MCB UP Ltd, United Kingdom

Chudley.R., and Greeno,R. (1988). Building Constructiono Handbook eleventh edition. Butteworth-Heinemann, United Kingdom

Seow-Eng Ong, (1997) Building defects, warranties and project financing from pre -completion marketing., MCB UP Ltd, United Kingdom

Notre Dame J.L.,(1992).Rusty Pipes: The Rust Decision and the Supreme Court's Free Flow Theory of the First Amendment.

Lateef, O.J (2009). Build Apprais. Palgrave Macmillan UK