DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

CONSTRUCTION OF A BLOWER ROOM AT PJA 229, INDAH WATER KONSORTIUM SDN BHD

Prepared by:

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DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

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It is recommended that the report of this practical training provided

By

Nurul Najihah Binti Rohaizat

2019258378

entitled

Construction of a Blower Room at PJA 229,

Indah Water Konsortium Sdn Bhd

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

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(PERAK)

(10 JANUARY 2022)

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 Berjasa Engineering Services and Trading for duration of 20 weeks starting from 23rd July 2021 and ended on 7th January 2022. 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.

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Date : 10 January 2021

ACKOWLEDGEMENT

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

I am so greatful as I consider myself as a lucky person with an opportunity to be a part of Berjasa Engineering Services and Trading. First and foremost, I would like to express my gratitude to Encik Mohd Aslam bin Nor Zahari for the opportunity given as he conducts my training with the help of his team professionals comprising of Puan Norsidah, Cik Fazween Najwa, Encik Amir and Encik Ahmad Mustaqim. They have helped me to get a better understanding, knowledge, and feel for real-world projects, as well as the theory involved in structural, building, and civil engineering analyses.

Next, I would like to thank my supervising lecturer, Ts. Muhammad Redza bin Rosman for helping and the rest of my course mates during our internship session with abundance of information and helpful feedbacks to ease our journey during internship. Many thanks also to the Department of Building UiTM Seri Iskandar for giving us, the students majoring in building, such a huge opportunity to be able to choose to go for internship. Do not forget to all the UiTM lecturers that have taught me in becoming a better person.

Last but not least, I would also like to extend my deepest appreciation to my parents who always support me with the decision I took in doing my intern. They have been my backbones during my intern period by sending and fetching me to the office as well as providing all my needs.

Thank you so much.

ABSTRACT

This report briefly describes the machineries and tools used, the calculation and cost of the construction, and process of constructing a of blower room It is produced according to few times site inspection experience at a construction site. The project took two months to finish completely on the construction side of the building. The objective of this report is to investigate the calculation and cost of the construction, to list the machineries and tools used in the project and to illustrate the process of constructing a blower room. In this report, there are two types of study method which is observation and interview method. Observation method is performed by do a site visit. Meanwhile, interviews were conducted with site supervisor of this project. The finding from this report is the construction of blower which it is started from setting out, excavation, foundation, installation of pipe, plinth beam and slab, superstructure, brick masonry work, installation of roof and lastly finishing. During this construction, changes in weather that are momentarily sunny and sometimes rainy caused the construction process to be somewhat disrupted. However, this blower room can be completed successfully on 28th November 2021.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

Wastewater treatment which also known as sewage treatment is to manage water discharged from homes, business, and industries to reduce the threat of water pollution (Hadi, 2018). There are three main stages of the wastewater treatment process which called primary, secondary and tertiary water treatment. The treatment processes take place in a wastewater plant. There are many wastewater treatment plants in Malaysia and one of the largest is Indah Water Konsortium Sdn Bhd.

However, selection of proper aeration and blower are two of the most important consideration at a wastewater treatment plant. Aeration energy consumption at wastewater treatment plants typically consumes 60% of all electrical usage (Mooers, 2020). Due to that, blower is needed. Blower can offset some of the energy requirements. It can create air flow as the total blower system creates pressure through resistance to air flow. When the pressure in headers is sufficient to overcome the static pressure, the optimal energy used is achieved.

Other than that, the function of blower controls is to provide the correct air flow at any time. Effect of that, it caused the enhanced of aeration efficiency. Besides, there are few advantages of proper air supply I wastewater treatment which is keeps the bacteria suspended, aid flocculation and supplies sufficient oxygen transfers for biochemical oxygen demand (BOD) removal and nitrification. Hence, blower room need to be built in wastewater treatment plant.

There are many advantages of aeration and blower. However, the aim of this study is to discover the construction of blower room conjected area in Malaysia.

1.2 Objectives

i. To investigate the cost and calculation of construction.

ii. To list the machineries and tools used in the project.

iii. To illustrate the process of constructing a blower room.

1.3 Scope of Study

The study is carried out at PJA 229, Indah Water Konsortium Sdn Bhd. This wastewater treatment is located at Sri Damansara, Kuala Lumpur. The scope of study is focused on the construction of blower room. This title will be presented with several subtopics namely the method of construction, cost and calculation, and lasty the problems occurred and solution taken to solve the problems.

1.4 Methods of Study

a. Observation method

This method is run while performing a site visit. The condition of the site was observed. The observations are recorded in notes. Furthermore, pictures of the progress of the site were captured by using a mobile phone. The pictures captured as a result of this site visit are included in this report. This type of study method is conducted for several times on different days until the project is completed.

b. Interview method

Interviews are also used to perfect the method of study. There are several ways of interviewing, but for this project, unstructured interviews were conducted. Interviews were conducted with site supervisor for this project. He is the one who will tell the details of the project, progress and issues that occurred during the project.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Berjasa Engineering Services and Trading (BEST) was registered in early year of 2020 with the clear aspiration to be recognized as a provider of best quality engineering services to the clients with a full range of services, planning and siting to activities within the construction stage and final hand-over of a facility either in general civil and mechanical works and supplies of related product.

BEST is located strategically at Shah Alam, Selangor. It started with experiences of providing services to the engineering industries, which offer clients in civil and engineering services such as building construction and renovation, lighting installer and supplier, sanitary and piping reticulation system and other related services.

In terms of renovation, clients usually also decide to replace and upgrade the auxiliary equipment and perform small-scale construction remediation. The purpose of this is to improve the condition of the construction part of structures and adapt them for the installation of new equipment. The engineering concept of all renovation phases is crucial for the renovation planning process, as it ensures the lowest possible drop in production.

Berjasa Engineering Services and Trading is also involved in preparation of project management, construction supervision, quality control and expert appraisal. Also have extensive experience in renovation works, electrical installation, built-in wardrobe, project planning, technical design, floating and underwater structures and pipelines, environmental and water quality control studies.

2.2 Company Profile

2.2.1 Company Information

Figure 2.1: Logo of Berjasa Engineering Services and Trading

Source: Berjasa Engineering Services and Trading (2021)

Company Name	**:**	Berjasa Engineering Services and Trading
Company Registration No.	**:**	0545836 W
MOF Registration No.	**:**	357-0002331838
Date of Registration	**:**	12 March 2020
Corporate Status	**:**	Sole Proprietorship
Registration	**:**	a. UiTM b. UPEN Selangor c. CIDB – G1 (B04, CE21, M15) d. Sijil Perolehan Kerja Kerajaan e. Sijil Taraf Bumiputera f. Kementerian Kewangan (MOF)
Business Address	**:**	Block K-1-158, Plaza Jelutong, Persiaran Gerbang Utama, Bukit Jelutong, 40150 Shah Alam, Selangor
Phone No.	**:**	016-837 1231 / 012-944 1231
Email	**:**	berjasaengineering20@gmail.com
Registered Bank	**:**	Malayan Banking Berhad

2.2.2 Company Services

Certificate no.	:	K1011419218276657
Registration reference no.	:	357-0002331838
Validity	:	20/1/2021 to 19/1/2024

Table 2.1: Company's Services

No.	Field register date	Field code	Description
1.	20/1/2021	090102	Bahan binaan dan peralatan jalan raya/ bahan binaan/ paip dan kelengkapan
2.	20/1/2021	140501	Peralatan kejuruteraan elektrik dan elektronik/ sistem, komponen elektrik, elektronik, lampu dan aksesori/ sistem elektronik
3.	20/1/2021	140502	Peralatan kejuruteraan elektrik dan elektronik/ sistem, komponen elektrik, elektronik, lampu dan aksesori/ lampu, komponen dan aksesori elektrik/elektronik
4.	20/1/2021	140503	Peralatan kejuruteraan elektrik dan elektronik/ sistem, komponen elektrik, elektronik, lampu dan aksesori/ lampu, komponen lampu dan aksesori
5.	20/1/2021	220301	Perkhidamatan/ penyelenggaraan/ pembaikan alat hawa dingin/ alat hawa dingin (window/split/berpusat)

6.	20/1/2021	220503	Perkhidmatan penyelenggaraan/ pembaikan kejuruteraan dan komunikasi/ perkakas/ sistem elektrik
7.	20/1/2021	220507	Perkhidmatan/ penyelenggaraan/pembaikan kejuruteraan dan komunikasi/ pump/ paip air dan komponen
8.	20/1/2021	221001	Perkhidmatan/ khidmat kebersihan dan rawatan/ pembersihan bangunan dan pejabat
9.	20/1/2021	221002	Perkhidmatan/ khidmat kebersihan dan rawatan/ membersih kawasan

Source: Berjasa Engineering Services and Trading (2021)

2.2.3 Registration Certificate

Having a valid business license is important to start a business in Malaysia. It includes licenses, registrations, permits and approvals. Business licenses can be applied for from Suruhanjaya Syarikat Malaysia (SSM) according to the location and business activity. Business licenses are required by law and administered by various government agencies, statutory bodies and local authorities.

Business licenses include registration, approval, licenses and permits. Compliance requirements vary by industry, business activity and location. The licenses and certificates that have been received by Berjasa Engineering Services and Trading are:

a) SSM Registration Certificate
b) MOF Registration Certificate
c) CIDB Registration Certificate
d) CIDB Government Employment Procurement Certificate
e) UPEN Selangor Registration Certificate
f) Contractor Service Centre Certificate
g) UiTM Registration Certificate

2.3 Company Organization Chart

During almost two years of operating this small company, Encik Aslam, the managing director of Berjasa Engineering Services and Trading has managed to retain five employees which is admin and human resources, bidding and proposal admin, building supervisor and another two technician. Figure below shows the organization chart of this company.

Figure 2.2: Company organization chart

Source: Berjasa Engineering Services and Trading (2021)

2.4 List of Project

2.4.1 Completed Projects

Table 2.2: Completed Projects of Berjasa Engineering Services and Trading

No.	Job Scope	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Demolish and tiles installation at Springville Apartment, Ampang, Selangor.	RM 4,500.00	12/7/2021	17/7/2021	7 days	Mr. Imran
2.	Supply of Barrier Gate for parking and entry success system at Johor Port, Pasir Gudang.	RM 3,250.00	19/7/2021	20/7/2021	2 days	Petron Fuel International Sdn Bhd
3.	Fabrication and installation of metal grille with powder coating at Jalan Tiara Mutiara 2 Service Apartment, Kuala Lumpur.	RM 4,400.00	19/7/2021	23/7/2021	5 days	Mr. Abdullah Hasni
4.	Tiles installation at Vista Alam, Shah Alam, Selangor.	RM 2,700.00	19/7/2021	24/7/2021	7 days	Mr. Azlan

5.	Renovation works at Suka Dessert Café, Selayang, Selangor.	RM 25,000.00	26/7/2021	7/8/2021	14 days	SHR Dessert (M) Sdn Bhd
6.	Renovation works at Jalan Rukun 6, Taman Gembira, Kuala Lumpur.	RM 14,750.00	9/8/2021	21/8/2021	14 days	Mr. Irwin
7.	Demolish and tiles installation at Sunway Alam Suria, Shah Alam.	RM 3,730.00	6/8/2021	12/8/2021	7 days	Mr. Fawwaz
8.	Renovation works at Bandar Saujana Putra, Selangor.	RM 13,445.00	13/8/2021	18/8/2021	7 days	Mr. Azerif
9.	Repair works at Vista Alam, Shah Alam.	RM 2,700.00	19/8/2021	21/8/2021	3 days	Mr. Razaleigh
10.	Toilet renovation such change the toilet bowl, dispose existing toilet accessories and piping works at Seksyen 3, Shah Alam.	RM 5,350.00	23/8/2021	28/8/2021	7 days	Mr. Izmel
11.	House renovation at Taman Gembira, Kuala Lumpur.	RM 12,500.00	30/8/2021	11/9/2021	14 days	Mr. Irwin
12.	Plaster ceiling at Metro Point Kajang.	RM 2,300.00	13/9/2021	15/9/2021	3 days	Metro Point Kajang

13.	Residential landscape at Desa Subang Permai, Shah Alam.	RM 1,265.00	14/9/2021	14/9/2021	1 day	Mr. Zahari
14.	Plaster ceiling installation at Waltz Residence, Bukit Jalil.	RM 2,500.00	15/9/2021	17/9/2021	3 days	Mr. Kevin
15.	Demolish and install tiles at Vista Alam Apartment.	RM 4,500.00	20/9/2021	25/9/2021	6 days	Mr. Faliq
16.	Renovation house at Setapak, Kuala Lumpur.	RM 17, 227.00	20/9/2021	2/10/2021	14 days	Madam Amirah
17.	Construction of blower room at PJA 229, Indah Water Konsortium.	RM 30,885.00	27/9/2021	28/11/2021	60 days	Indah Water Konsortium Sdn Bhd

Source: Berjasa Engineering Services and Trading (2021)

2.4.2 Project in Progress

Table 2.3: Project in Progress of Berjasa Engineering Services and Trading

No.	Job Scope	Start Date	Estimated Completion Date	Status	Client
1.	Painting works at Kristal View Apartment, Seksyen 7, Shah Alam.	2021	2022	Ongoing	JMB Kristal View
2.	As a sub-contractor of the project under Elrika Contractor which as main-contractor.	2021	2026	Ongoing	Tenaga Nasional Berhad
3.	Plaster ceiling installation at Vista Alam Apartment, Shah Alam.	2021	2021	Ongoing	Madam Jia Onn
4.	Renovation house at Desa Parkcity, Kuala Lumpur.	2021	2022	Ongoing	Mr. Syed Hizwan
5.	Kitchen renovation which demolished the tiles wall and reinstall the new one, install kitchen cabinet at Springville Apartment, Ampang, Selangor.	2021	2022	Ongoing	Mr. Koon Lau

Source: Berjasa Engineering Services and Trading (2021)

CHAPTER 3.0

CONSTRUCTION OF BLOWER ROOM

3.1 Introduction

This project is the construction of a blower room at PJA 229, Indah Water Konsortium which located at Sri Damansara, Kuala Lumpur. The blower room measures 19.685 ft x 19.685 ft with 11 ft height. It has two exhaust fans on both sides of the room on the right and left. The left is for the inlet and the right is for the outlet. This project is also to install turbo blower with specifications such discharge 70 m3/min, minimum 75 kW and the pressure range 0.1 to 0.65 bar. This project has cost RM 30,885.00 and was successfully completed on 28th November 2021. Figure 3.1 shows the floor plan of the blower room.

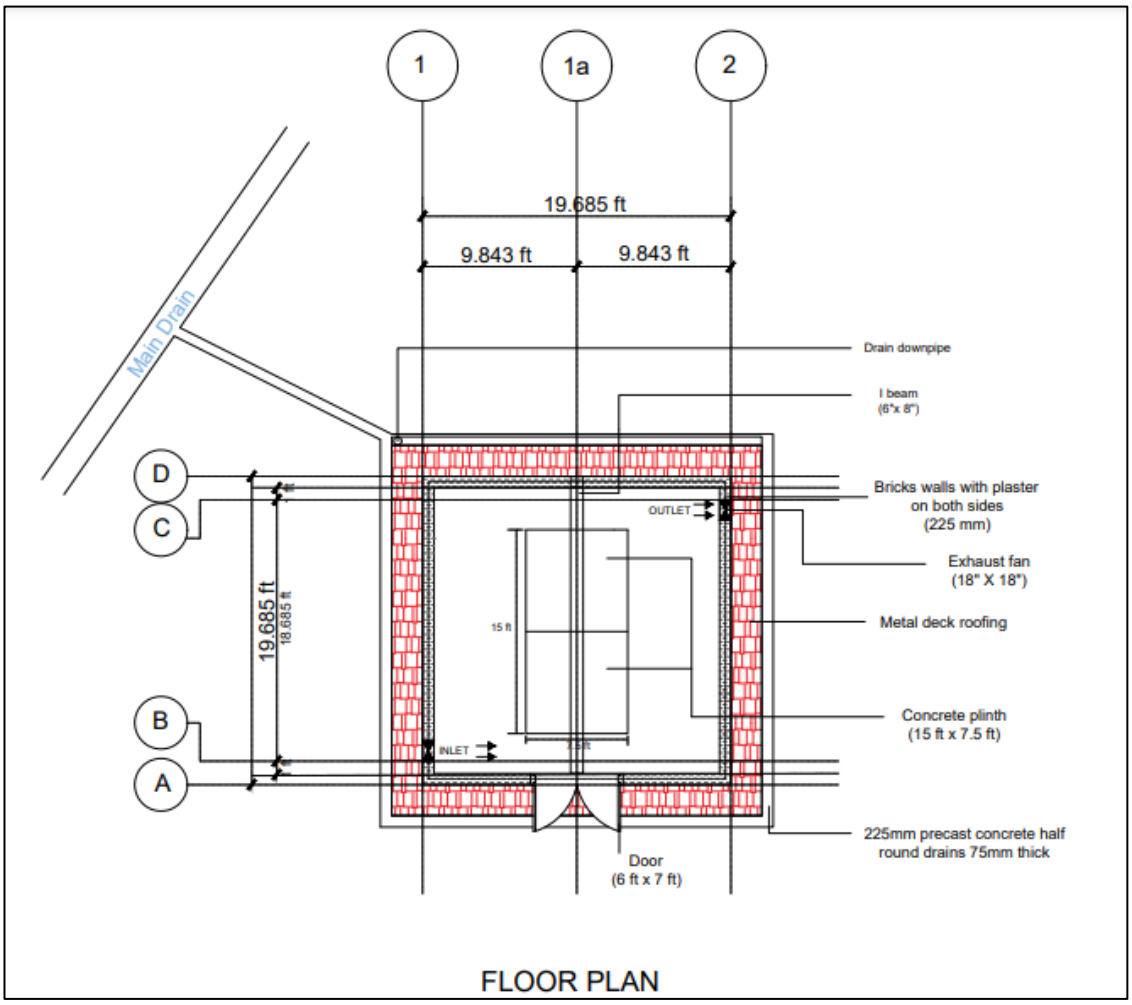

Figure 3.1: The floor plan of blower room

3.2 Calculation and Cost of the Construction

Before a project is carried out, several things need to be emphasized such as the amount of materials required and the cost to be invested. Estimation of the amount of these two needs to be calculated correctly to avoid losses to the company. After everything has been calculated, a quotation of the project will be given to the client whether they agree to continue the project or cancel it.

To estimate cost, the area of the project needs to be measured first. For this project, the building is 19.685 ft x 19.685 ft with 11 ft height. There are a few materials that need to be calculated so that so that there is no shortage of materials. If this happens, the company will incur losses because it will have to take responsibility for the shortfall without involving the client's budget. Company will add a 5% of each calculation to prevent from shortage of purchases. Figure below shows the illustration of the blower room dimension of one side the wall in meter (m).

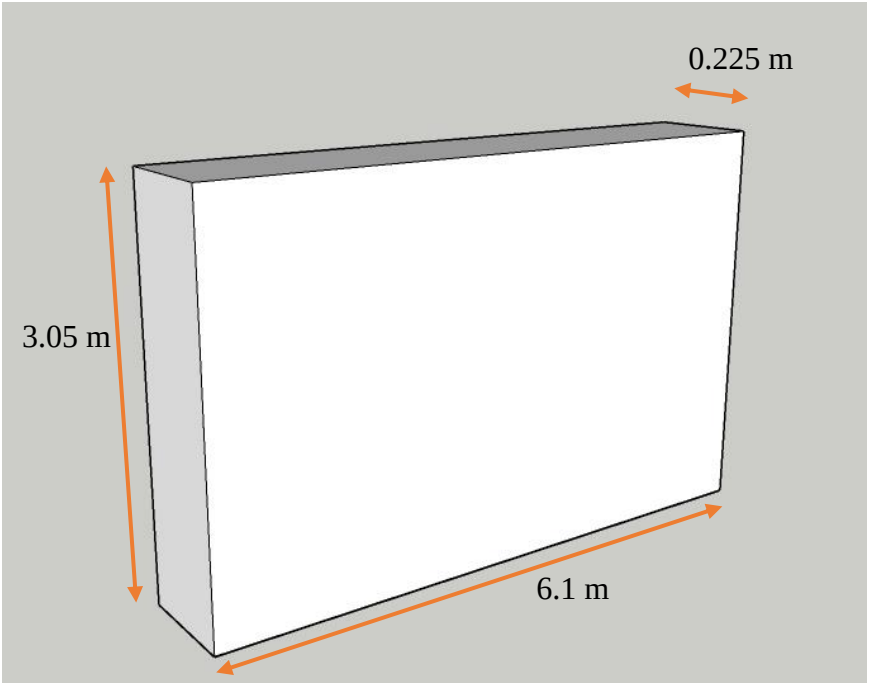

Figure 3.2: Illustration of wall dimension

3.2.1 Calculation of Materials (Brick Wall)

a) Calculation of brick

Based on figure 3.2:

Step 1: Volume of brick wall (1 side of wall)

= 3.05 m x 6.10 m x 0.225

= 4.18 m^3

Step 2: Volume of brick

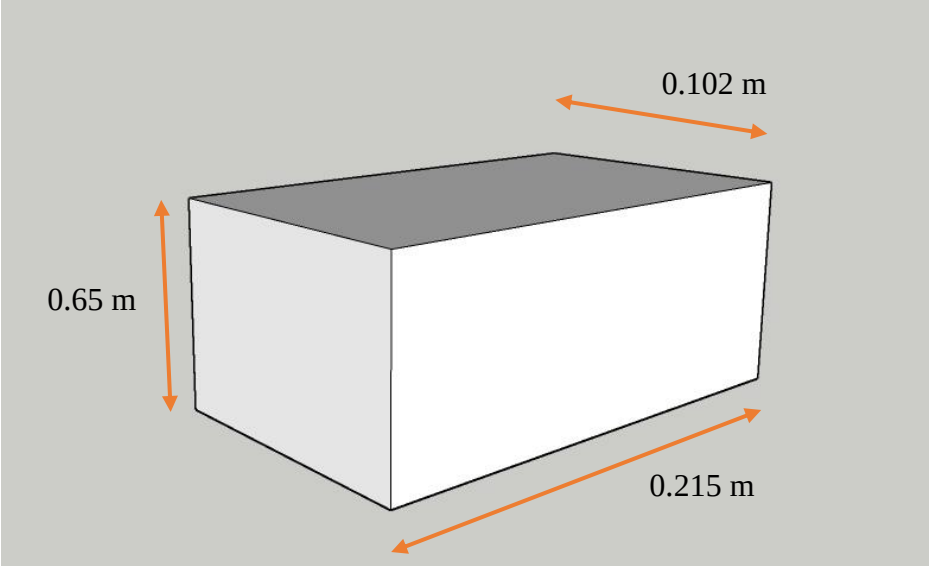

Figure 3.3: Illustration of brick dimension

= 0.65m x 0.102 m x 0.225 m

= 0.0014 m^3

Step 3: 1 set of brick

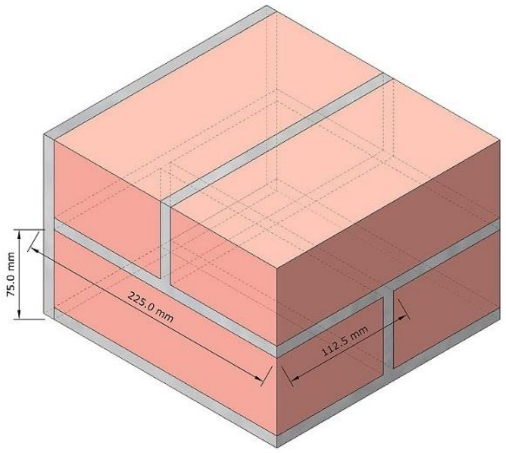

Figure 3.4: Illustration of arrangement of the brick

Source: https://en.wikipedia.org/wiki/Brickwork

1 set = 4 bricks

= 0.0014 m^3 x 4 bricks

= 0.0056 m^3

Step 4: Number of sets

= 4.18 m^3 (vol of b.wall) / 0.00056 m (vol of 1 set brick)

= 746.43 sets

Step 5: Number of bricks for 1 side of wall

= 746.43 x 4 bricks

= 2985.7

= 2,986 bricks

Step 6: Number of bricks for 3 sides of wall

= 2986 x 3

= 8,958 bricks

Step 7: Number of bricks for front wall

Vol. of door **=** 1.83 m x 2.13 m x 0.225 m

= 0.88 m^3

=4.18 m^3 - 0.88 m^3

= 3.3 m^3

Number of bricks **=** 3.3 m^3 / 0.0056 m^3

= 589.3 set

= 589.3 x 4

= 2357.2

= 2,358 bricks

Total number of bricks:

= 8958 + 2358

= 11,316 bricks

*1 pallet = 570 bricks

= 11,316/570

= 19.85

= 20 pallets

b) Calculation of Sand

180 bricks	=	150 kg sand
11,316 bricks	=	? kg
180/150 kg	=	11,316/ x
	=	9,430 kg

c) Calculation of Cement

180 bricks	=	25 kg
11,316 bricks	=	? kg
180 kg/25 kg	=	11,316/ x
	=	1,572 kg

Table 3.1 below shows the materials used for brick wall.

Table 3.1: Materials used for brick wall

No.	Materials	Unit	Total
1.	Brick	Pallet	20
2.	Sand	Kg	9,430
3.	Cement	Kg	1,572

Source: Berjasa Engineering Services and Trading (2021)

3.2.2 Cost of the Project

Project cost is the total finance needed to finish the project which consist of a direct cost and indirect cost. Furthermore, project cost are any expenditures made estimated to be made or financial obligations incurred or estimated to be incurred to complete the project listed in the project baseline. Table below show the quotation of cost of the project that had been sent to the client. The real quotation document can refer at Appendix H.

Table 3.2: Quotation of the Project

Items	Description	Unit Price (RM)	Total Price (RM)
	Cable work details:		
1.0	To construct a building with 19.685 ft x 19.685 ft x 11 ft	21,025.00	21,025.00
2.0	To dismantle and supply 2 Cove MCCB 250A, Bast Bar Cabling	9,860.00	9,860.00
3.0	All price includes material supply, installation, logistic, workmanship, waste disposal and work area cleaning.		
	Total Price (RM)		30,885.00

Source: Berjasa Engineering Services and Trading (2021)

3.3 The Machineries and Tools

There is several equipment that has been used in the construction industry. These are used for both large and small scales purposes. For this project, due to its small area, the machines used are also machines that are usually used as light transportation of building material, construction, small demolitions, and excavation. The tools used are also simple and easily available tools.

Figure 3.5: The backhoe

Figure 3.5 above shows the backhoe used in this project. Backhoe are slightly smaller than excavator. Backhoe loaders are very common in urban engineering and small construction projects. It is used to excavate soil to make site clearance and also backfill soil in this project.

Figure 3.6: Truck mixer concrete

Figure 3.6 shows a picture of truck mixer concrete which a device capable of preparing concrete mixers of varying strength precisely as well as quickly. Portable concrete mixers can be used in small and medium-sized application.

Figure 3.7: Tamping rammer

Figure 3.7 above is tamping rammer. It is a device used for compacting different types of soil under various construction scenarios. It applies impacts to the surface of soil to level and compact it uniformly. This machine is used after the soil in the backfill after the foundation part has been completed in this project.

Figure 3.8: Cordless drill

Cordless drill as shown in figure 3.8 used in construction of blower room. It is also designed to drive screws. The type of bit used for this purpose is the star-shaped Philips head which is most commonly used. This makes it easy to install screws on certain parts such as hinges on doors.

Figure 3.9: Circular saw

Circular saw as shown in figure 3.9 function as to get accurate and quick cuts. In this project, it is used to cut timber that needs to be used as a frame for formwork of slab, foundation and column. It is easier and faster than a hand saw.

In addition to machines, simple tools are also used during construction. These simple tools are used for small tasks with a specific purpose. For example, for making measurements, for cleaning purposes, for building construction and many more. Figures below shows the tools used in this construction.

Figure 3.10: Invar tape

Invar tape as shown in figure 3.10 is used in this project uses this tool to measure the boundaries of the building as it is available in lengths of 5m, 10m, 20m, 30m, and 50m. The coefficient of thermal expansion of invar alloy is very low. It is not affected by changes in temperature. These tapes should be handled with care otherwise bends or kinks may be formed.

Figure 3.11: Hammer

Figure 3.11 above shows the hammer used in the project. This tool is one of the most important tools, especially woodworking. Hammers are used for general carpentry. it is used to create the framework of the building with nailing work. Avoid to use a hammer with a loose or damaged handle as it will harm the consumer.

Figure 3.12: Hoes

Hoes as shown in figure 3.12 are tool which consists of metal plate attached to a long timber handle. It is suitable for small work of excavate the soil. In this project, it is used to excavate the ground to make a foundation measuring 3ft x 3ft x 2ft. With a hoe can also remove roots that will interfere with the construction process.

Figure 3.13: Trowel and bucket

Trowel and bucket shown in figure 3.13 have their respective functions. Trowel is a handheld flat tool. It is used for applying and spread mortar in bricklaying. As for bucket, it is a container with movable gates at the bottom that is attached to table to transport concrete and mortar.

Figure 3.14: Scaffolding

Figure 3.14 above shows a scaffolding which is used in building construction. Scaffolding is a temporary device used to elevate and support workers and materials during construction. It consists of more than one planks of convenient size and length. This tool makes it easy for workers to do work at high place.

3.4 The Process of Constructing a Blower Room

i. Setting out

After approval of drawings from as well architect as well as structural engineer, clean the construction site from trees and debris. Then, make the plot boundaries. Determine the measurement of the land by using measuring tape as shown in figure 3.15 below according to the measurements that have been set as in the plan which is (19.685 ft + 2ft) x (19.685 ft + 2 ft). The additional 2 ft are for drainage. After that, use pegs to label the point of the measurement.

Figure 3.15: Plotting the boundaries

ii. Excavation

Excavate the land according to the measurements that have been measured and 3 ft depth of foundation. This process is carried out by using a backhoe. Site preparation, levelling and excavating is a process done on the same day and does not require a long time that is only one day. Figure 3.16 below shows the soil that has been excavated.

Figure 3.16: The excavated soil

iii. Foundation

The next day, install the formwork for the foundation of 3 ft x 3 ft x 2ft by hoe. Foundation bars shall be laid on the surface. Column steel and foundation steel need to be tied properly to avoid joint cracks as shown in figure 3.17 the type of steel is Y10 steel bar as the main reinforcement and R6 steel bar as a link for the column reinforcement. Then poured by plain cement concrete (PCC). Leave it for three days to let it dry. Once PCC is done, shuttering for a foundation is placed. It should be strong enough to withstand all types of dead and lived loads.

Figure 3.17: Foundation rebar

iv. Install pipe

While waiting for the foundation to be completed, the main air pipe of 12” can be installed. Then, backfill the remaining excavated area around foundation with soil once the foundation is completed. Then, compact the soil using a vibrating rammer. Figure below shows the soil that has been backfilled.

Figure 3.18: The backfilled foundation

v. Plinth beam and slab

Install timber around the area of site which 21.685 ft x 21.685 ft as frame of the beam and slab. Nails the frames by using a hammer to stick the timbers. In addition, nylon twine is also used to further strengthen the frame as shown in figure 3.19 Then, lay down BRC fabric which for the reinforcement of slab. The type of BRC used is BRC A10. Once the framing is completed, concrete of Grade 25 is poured.

Figure 3.19: Frames of slab

vi. Superstructure

Framing begins on the building as the plinth beam and slab has been dried. Firstly, install the wood frames of column and beam. Nails the frames by using a hammer to stick the timbers that make up the frames. Once the framing is completed as shown in figure 3.20, concrete can be poured onto the frame of column and beam. This process does take a while which is five days due to unpredictable weather which caused the work to be delayed and need to be extended. It is important that everything is done correctly.

Figure 3.20: The formwork of column

vii. Brick masonry work

Masonry work can be conducted as the framework completed. According to the drawing, concrete brick is used in this works. The masonry work is done by using a cement mortar which it is mixture of cement and sand. The mortar is laid on the brick by using trowel.

Figure 3.21: Brick masonry

viii. The lintel over door and window gaps

The lintel is constructed on the door to support masonry work over it. Two persons are required to completed this part which both people need to hold each end of the lintels. After that, further masonry work is done.

Figure 3.22: Lintel of door

ix. Installation of roof

Install the roof frame with screws to the prefabricated steel using a drill. After the roof frame is installed, install the aluminium roof on the roof frame. The labours had to go upstairs using scaffolding to carry out this work.

Figure 3.23: Installation of roof

x. Fixture

Almost all the construction work is completed as the following the above steps are taken. Install the double leaf timber door on the door frame which is 6 ft x 7 ft that has been set as in the drawing that is located at the front of the building. Use a drill to attach the screws to the frame.

Figure 3.24: Deadbolt hole of door

xi. Finishing

This is the last step in the construction of a building that is finishing. For the wall, first paste gypsum plaster on the wall in both the inside and outside of the building. Flatten the plaster with a gypsum plastering trowel. Leave for a day to dry. After drying, also paint the walls using emulsion paint. For the floor, epoxy paint is used as shown in figure … After everything is done, site cleaning is done to clean up the messes and prepping the area for the next subcontractor to manage the wiring, plumbing and turbo blower installation.

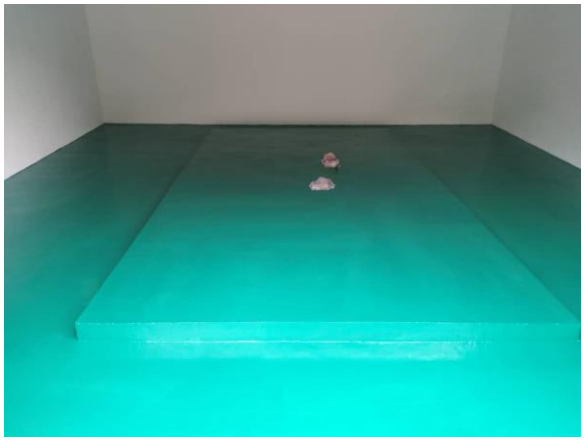

Figure 3.25: The floor

CHAPTER 4.0

CONCLUSION

4.1 Conclusion

To sum it up from this report, a blower room is important and necessary as blower can offset some of the energy requirements for wastewater treatment plant. The method used for the construction of this blower room is the method that is always used for the construction of buildings. There are some problems encountered throughout the construction such as unpredictable weather. Rain will cause the construction process to stop and in turn will cause time to be dragged away from the proper time. Therefore, skill of project planning is required before the tender is approved. All probabilities need to be weighed before the project is carried out. In addition, the cost of the project must be calculated correctly to avoid losses to the company. In a nutshell, all problems can be solved successfully so that this building can be built.

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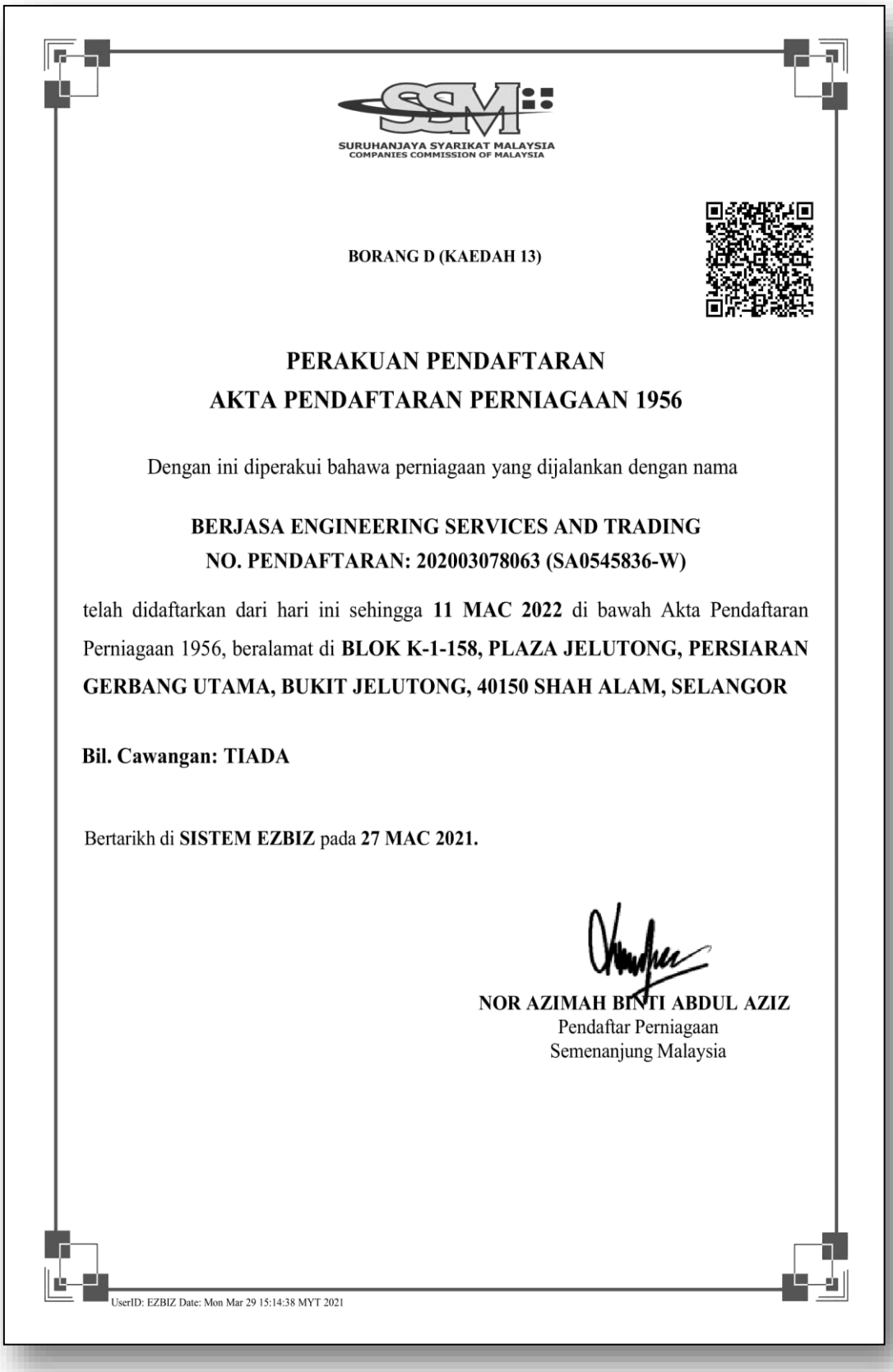
APPENDICES

Appendix A: SSM Registration Certificate



SURUHANJAYA SYARIKAT MALAYSIA
COMPANIES COMMISSION OF MALAYSIA

BORANG D (KAEDAH 13)

PERAKUAN PENDAFTARAN
AKTA PENDAFTARAN PERNIAGAAN 1956

Dengan ini diperakui bahawa perniagaan yang dijalankan dengan nama

BERJASA ENGINEERING SERVICES AND TRADING
NO. PENDAFTARAN: 202003078063 (SA0545836-W)

telah didaftarkan dari hari ini sehingga **11 MAC 2022** di bawah Akta Pendaftaran Perniagaan 1956, beralamat di **BLOK K-1-158, PLAZA JELUTONG, PERSIARAN GERBANG UTAMA, BUKIT JELUTONG, 40150 SHAH ALAM, SELANGOR**

Bil. Cawangan: TIADA

Bertarikh di **SISTEM EZBIZ** pada **27 MAC 2021.**

NOR AZIMAH BINTI ABDUL AZIZ
Pendaftar Perniagaan
Semenanjung Malaysia

UserID: EZBIZ Date: Mon Mar 29 15:14:38 MYT 2021

Appendix B: MOF Registration Certificate

KEMENTERIAN KEWANGAN MALAYSIA

SIJIL AKUAN PENDAFTARAN SYARIKAT

NO. SIJIL	:	K10114192182756657
NO. RUJUKAN PENDAFTARAN	:	357-0002331838
TEMPOH SAH LAKU	:	20/01/2021 - 19/01/2024

Bahawa dengan ini diperakui syarikat :

BERJASA ENGINEERING SERVICES AND TRADING (SA0545836-W)
16, JALAN PULAU ANGSA U10/32A
BANDAR NUSARHU
SEKSYEN U10
PETALING
40170 SHAH ALAM
SELANGOR, MALAYSIA

Telah berdaftar dengan Kementerian Kewangan Malaysia dalam bidang bekalan/perkhidmatan di bawah sektor, bidang dan sub-bidang seperti di Lampiran A. Kelulusan ini adalah tertakluk kepada syarat-syarat seperti yang dinyatakan di Lampiran B. Individu yang diberi kuasa oleh syarikat bagi urusan perolehan Kerajaan adalah seperti berikut :

ENCIK MOHD ASLAM BIN NOR ZAHARI	880625035077	PENGURUS OPERASI

t.t

DATO' ZAMZURI BIN ABDUL AZIZ
Perbendaharaan Malaysia Semenanjung
***b.p.* Ketua Setiausaha Perbendaharaan**
Kementerian Kewangan Malaysia

Tarikh Berdaftar Dengan Kementerian Kewangan Malaysia : 20/01/2021

(Sijil ini adalah cetakan komputer dan tidak memerlukan tandatangan)

Appendix C: CIDB Registration Certificate

PERAKUAN PENDAFTARAN

Adalah dengan ini diperakui bahawa kontraktor yang dinyatakan di bawah ini telah berdaftar dengan Lembaga mengikut Bahagian VI Akta Lembaga Pembangunan Industri Pembinaan Malaysia 1994. Pendaftaran ini adalah tertakluk kepada syarat-syarat yang telah ditetapkan bersama perakuan ini.

No. Pendaftaran	:	0120210105-SL065545
Nama Kontraktor	:	BERJASA ENGINEERING SERVICES AND TRADING
Alamat Berdaftar	:	16, JALAN PULAU ANGSA U10/32A BANDAR NUSARHU SEKSYEN U10 40170 SHAH ALAM SELANGOR
Daerah	:	PETALING
Tarikh Mula Berdaftar	:	06/01/2021

GRED	KATEGORI	PENGKHUSUSAN
G1	B	B04
G1	CE	CE21
G1	ME	M15

Tarikh Mula Berkuatkuasa : **06/01/2021**

Tarikh Habis Tempoh Perakuan : **05/01/2023**

STATUS: BARU

Ketua Eksekutif

Lembaga Pembangunan Industri Pembinaan Malaysia

Tarikh: 06/01/2021

Appendix D: CIDB Government Employment Procurement Certificate

CIDB MALAYSIA

SIJIL PEROLEHAN KERJA KERAJAAN

Adalah disahkan syarikat/Firma ini adalah berdaftar dengan Lembaga Pembangunan Industri Pembinaan Malaysia dan tertakluk kepada syarat-syarat termaktub bersama sijil ini.

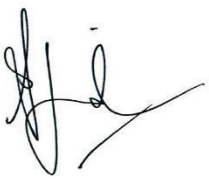
No. Pendaftaran	:	**0120210105-SL065545**
Nama Kontraktor	:	**BERJASA ENGINEERING SERVICES AND TRADING**
Alamat Berdaftar	:	**16, JALAN PULAU ANGSA U10/32A BANDAR NUSARHU SEKSYEN U10** **40170 SHAH ALAM** **SELANGOR**
Daerah	:	**PETALING**
Tarikh Mula Berdaftar	:	**04/01/2021**

GRED	KATEGORI	
G1	B	(Pembinaan Bangunan)
G1	CE	(Pembinaan Kejuruteraan Awam)
G1	ME	(Mekanikal dan Elektrikal)

PEGAWAI SYARIKAT YANG DITAULIAHKAN	NO. K/P
MOHD ASLAM BIN NOR ZAHARI	880625035077

Tarikh Mula Berkuatkuasa : **26/01/2021**

Tarikh Habis Tempoh Perakuan : **05/01/2023**



Ketua Eksekutif

Lembaga Pembangunan Industri Pembinaan Malaysia

Tarikh: 26/01/2021

Appendix E: UPEN Selangor Registration Certificate

SALINAN

Sistem Tender Online Selangor 2.0
Pejabat Setiausaha Kerajaan Negeri Selangor

PENGESAHAN PENDAFTARAN SYARIKAT

Dengan Ini Disahkan Bahawa

BERJASA ENGINEERING SERVICES AND TRADING

No. Pendaftaran: 202003078063 (SA0545836-W)

telah berdaftar dengan

Unit Perancang Ekonomi (UPEN)
Selangor

pada

15/02/2021

No Pendaftaran	202003078063 (SA0545836-W) Tarikh Luput SSM : Tiada Maklumat
Daerah	Petaling
No Rujukan Sijil CIDB	0120210105-SL065545
Tarikh Sahlaku Sijil CIDB	06 Jan 2021 - 05 Jan 2023
No Rujukan Pendaftaran MOF	357-0002331838
Tarikh Sahlaku Pendaftaran MOF	20 Jan 2021 - 19 Jan 2024
Gred	• **(G1) KEUPAYAAN TIDAK MELEBIHI RM200,000.00** Jumlah Bidang Pengkhususan: 3
Kod Pengesahan Sijil	WCHMENPY

Appendix F: Contractor Service Centre Certificate

KEMENTERIAN PEMBANGUNAN
USAHAWAN DAN KOPERASI
MINISTRY OF ENTREPRENEUR DEVELOPMENT AND COOPERATIVES

PUSAT KHIDMAT KONTRAKTOR

KEMENTERIAN PEMBANGUNAN USAHAWAN DAN KOPERASI
SIJIL TARAF BUMIPUTERA
KONTRAKTOR KERJA

Adalah dengan ini syarikat tuan seperti tercatit di dalam Sijil ini diiktiraf sebagai kontraktor kerja bertaraf Bumiputera. Pemberian pengiktirafan ini adalah tertakluk kepada syarat-syarat termaktub di belakang sijil.

NO. SIJIL PENDAFTARAN	GRED PENDAFTARAN	KATEGORI	TEMPOH SAH LAKU
0120210105-SL065545	**G1/Kelas F**	**B**	**DARI : 10/02/2021**
	G1/Kelas F	**CE**	**HINGGA : 05/01/2023**
	G1/Kelas F	**ME**	

NAMA DAN ALAMAT BERDAFTAR

BERJASA ENGINEERING SERVICES AND TRADING
16, JALAN PULAU ANGSA U10/32A BANDAR NUSARHU SEKSYEN U10
40170 SHAH ALAM
SELANGOR
PETALING

PEGAWAI SYARIKAT YANG DITAULIAHKAN	NO. K/P
MOHD ASLAM BIN NOR ZAHARI	880625035077

(MARLINA BINTI RAMLY)
Pengarah
Pusat Khidmat Kontraktor
Kementerian Pembangunan Usahawan dan Koperasi
Tarikh: 10/02/2021

Appendix G: UiTM Registration Certificate

UNIVERSITI TEKNOLOGI MARA

SIJIL AKUAN PENDAFTARAN

Bahawa dengan ini diperakui bahawa:

NAMA SYARIKAT

SA0545836W
BERJASA ENGINEERING SERVICES AND TRADING

ALAMAT

1, JALAN SUBANG PERMAI U6/8, DESA SUBANG PERMAI SHAH ALAM
40150 Shah Alam
Selangor

Telah Berdaftar Sebagai Vendor UiTM pada 12/02/2021

Appendix H: Quotation of the project

QUOTATION

BERJASA ENGINEERING SERVICES AND TRADING (SA0545836W)

Block K-1-158, Plaza Jelutong, Persiaran Gerbang Utama, Bukit Jelutong, 40150 Shah Alam, Selangor

*Renovation Works *Tiling *Painting *Built-in Wardrobe *Plumbing *Plaster Ceiling *Electrical Installation

*Wiring *Air Conditioning *Kitchen Cabinet *Wall Partition *CCTV *Waterproofing

REGISTERED UNDER MOF, CIDB G1, SPKK, STB, UPEN, UiTM

No. H/P: +60129441231 Email: berjasaengineering20@gmail.com

Customer	: MR. CHUNGLIM	Date	: 05/11/2021
Address	: N/A		
Subject	: BLOWER ROOM CONSTRUCT	Our Ref	: Q000212
Quoted By	: NORSIDAH HASSAN	Your Ref	: Q000212

ITEMS	Part No.	DESCRIPTION	QTY	UNIT	UNIT PRICE (MYR)	TOTAL PRICE (MYR)
		Blower Room Construct				
1.0		To construct a building with 19.685 ft x 19.685 ft x 11 ft			21,025.00	21,025.00
2.0		To dismantle and supply 2 Cove MCCB 250A, BAST BAR CABLING			9,860.00	9,860.00
3.0		All price includes material supply, installation, logistic, workmanship, waste disposal and work area cleaning				
				Total Price, MYR:		**30,885.00**

Note

Terms and Conditions

Price : Price quote is based on lump sum basis in Ringgit Malaysia (RM)
Validity : 30 days from submission date
Payment Milestone : 50% - Upon receive order, 30% in progressive and 20% job completion

Prepared By,

NORSIDAH HASSAN