



DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

THE CONSTRUCTION WORKS OF ELEVATED WATER TANK AT TAMAN
ABAD, TEBRAU, JOHOR

PREPARED BY:
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UNIVERSITI TEKNOLOGI MARA
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FEBRUARY 2022

By

NURUL AIMI AJLAA BINTI MD HASRIN

2019258894

It is recommended that this practical training report provided

Entitled

**THE CONSTRUCTION WORKS OF ELEVATED WATER TANK AT
TAMAN ABAD, TEBRAU, JOHOR**

**Be accepted in the partial fulfil of the requirement for obtaining the Diploma in
Building.**

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(PERAK)**

FEBRUARY 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 Ranhill SAJ Sdn Bhd for duration of 20 weeks starting from 23 August 2021 and ended on 07 June 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.

.....
Name : NURUL AIMI AJLAA BINTI MD HASRIN
UiTM ID No : 2019258894
Date : 10 January 2022

ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah, the Most Merciful, the Most Graceful. I might want to expand my sincere appreciation for the direction, counsel and help delivered all through the time of preparing by the accompanying gathering of stunning people. As a matter of first importance, I might want to express gratitude toward En Asahari bin Saimon for the chance given, to lead my preparation in his regard organization. His group of experts including En Mohd Arfizi, En Azam, En Nazrin, Puan Liyana which have empowered me to learn and foster my understanding, information of knowledge and feel of constant ventures, and the hypothesis associated with examination of designs, building and common works. They are additionally mindful towards smoothing out and surveying my preparation. Additionally, to the all-site staff who have involved stretched out their collaboration and help to additional improve my capacity in understanding the methodology in development and site organization, tests strategies, site security and best practices in the business. It is an honor for me to be offered the chance to 'work' with every one of you.

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To wrap things up, my unique gratitude to my cherished parents for their penances or sacrifices throughout the long term. Not to forget to all my friends who were always lend me their time and attention in order to keep my spirit up and helping me whenever I need.

Thank you kindly.

ABSTRACT

Elevated water storage tank is a raised structure supporting a water tank built or constructed at a height adequate to compress an appropriation framework for consumable water, and to give crisis stockpiling to fire assurance. Water storage tank regularly work related to underground or surface service reservoirs, which store treated water near where it will be utilized. The objective of this report is to learn how to build a good elevated water storage tank that fulfil the requirements needed based on Suruhanjaya Perkhidmatan Air Negara (SPAN) and any related requirements from Ranhill SAJ Johor. Last but not least is to acknowledge the difference between the ground water storage tank and elevated storage tank and methodology in building the structures. While building this elevated water storage tank there is so many methods that has being used in order to finish this project. One of them is they need to consider every element to construct this project. To conclude, this project is a very important to every section of industries specially to house residential area as water demand or supply is one of a must elements that need in every day

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

The code of practice for design and installation of water storage tank in Malaysia can refer to Suruhanjaya Perkhidmatan Air Negara (SPAN) or books of the Uniform Technical Guidelines (UTG).

Water service or water supply refers to all the activities and means put in place to provide people with equitable access to quality water, in sufficient quantities and at an affordable price. (NorazmiMohdNor, 2016) Nonetheless, the distinction between the system and the service is crucial. The system is the means used to offer the assistance of service. For example, a drill outfitted with a manual siphon gives one kind of service, while a home water circulation system gives one more characterized a water service as the arrangement of water as per a bunch of key pointers. So, water storage tank is an important medium that needs to be highlighted in every construction works. It is because water storage tank is one of the requirements needed to supply water for every consumer in any section such as to domestic area and industrial area. The water supply also incorporating the above parts will pass on and disperse consumable water to different classes of end users including residential, commercial, institutional, industrial, and social and religious premises.

Storage tanks are a basic piece of an aberrant water supply system, where, water isn't provided constantly in example, water is provided distinctly for few hours in a day. Thus, it becomes important to store water to complete various exercises for the duration of the day. Capacity tanks store water to address water issues every day and in any event, during fix works of mains, putting out fires and water shorts. There is five types of water tank or water storage tank that can be classified based on location and based on shape. The five types of water storage tank are elevated tank, ground water tank, chemical contact tank, vertical cylindrical dome top and hydro-pneumatic tank.

This report will be focusing more on elevated water storage tank. So, elevated water storage tank is a raised structure supporting a water tank built or constructed at a height adequate to compress an appropriation framework for consumable water, and to give crisis stockpiling to fire assurance. It is also known as water tower that will create pressure at the ground level outlet of 1 psi per 2.31 of feet of elevation. Elevated tanks also permit the normal power of gravity to create steady water strain all through the framework. In view of the expected application and requirements of the conveyance region, raised water tanks can be engineered utilizing an expansive scope of shapes, sizes, and materials. Besides that, an elevated water tank also might be in danger of freezing in under zero temperatures, which thusly could leave the local area or community without a dependable water source. An assortment of water tank warming techniques might be carried out to forestall freezing, including gravity dissemination, steam loops, and additionally direct steam release as it is importance for cold resistance.

The second types are ground water tank which has been made from lined carbon steel. It might get water from water well or from surface permitting an enormous volume of water to be put in inventory and utilized during peak demand cycles. The third type is a chemical contact tank that be made of polyethylene construction, allows for retention time for water treatment. Next, is a vertical cylindrical dome top. These kinds of tanks might hold from fifty gallons to a several million gallons. Horizontal cylindrical tanks ordinarily are commonly utilized for transport in light of the fact that their position of safety makes a low focus of gravity assisting with keeping up with equilibrium for the vehicle trailer or truck. The last one is hydro-pneumatic tank, this sort of tank is ordinarily a horizontal pressurized storage tank. Constraining this supply of water makes a surge free conveyance of put away water into the distribution system.

Last but not least this elevated water storage tank has their own advantage compared to the others kind of tank such as provides a structure capable of being located conveniently near the center of the distribution and independent of risk the pumping equipment failure during an emergency. Nevertheless, the aim of this study case is to learn the construction of elevated water tank or storage and the how it works to every section.

1.2 Objectives

- I. To investigate and learn the method of construction in building the elevated water storage tank on site.
- II. To investigate and study the details of the project by referring the document given.
- III. To determine the problems occurred during site construction and understanding the solution to fix the problems.
- IV. To know the difference of elevated water tank and non-elevated water tank also the advantages and disadvantages of them.

1.3 Scope of Study

This case study is carried out at Taman Abad, Tebrau site which located at Johor Bahru, Johor. This study case is focusing on construction works of building an elevated water storage tank in order to upgrade the distribution system area. This case study or project will be conducted by few experienced people who responsible to all of the works on the site construction such as site supervisor, engineering consultant, quantity surveyor and many more. All the construction works that has been done by labor who involved such as slump test, pipping test, pressure test for pipping and many more has been studied thoroughly face to face on the site construction. This project also uses suitable kinds of machineries to complete this construction

1.4 Methods of Study

There are several ways of collecting the data needed for this report which are:

a) Observation

The observation that has been made based on the data collection of the project are the method of used in testing the correct and suitable pipe to be used in the distribution pipeline. Next, the period of the site visits to observe every surrounding area is about 1 to 1 and half hour every time on the site construction. The observation only takes 2 weeks because of the Covid-19 pandemic issues. The estimated completion date for this project is around 24 September 2022 which the contract period is 18 months. Other things that had been observed also the machinery they used to works on the site construction such as back hoe, loaders and excavator. The observation data had been collected by capturing photos needed and some short notes.



Figure 1.1: An observation of testing the thickness of pipe.

b) Interview

During the site visit, there is a person or can be called as an assistant project manager who will be assisting any practical student who came to collect their data or any information needed based on the site observation. From this opportunity, as a practical student will have to focus and give full attention on site and it is easy to ask any question that cannot be understand about the project. This method also teaches on how to communicate better with another person through this interview method.

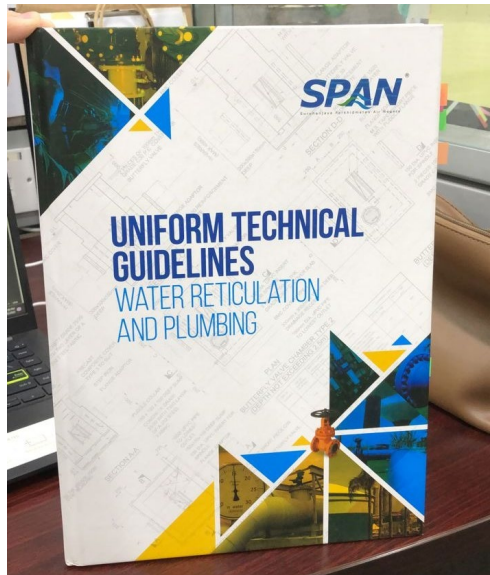


Figure 1.4: UTG books

d) Site visits

Site visits are also vital for report research because they allow me to collect data for the report face to face. Furthermore, when I visit the site, I am able to gather more information by observing and interviewing the workers or laborer who are knowledgeable about the construction process. The site visits also necessitate full safety gear and PPE.



Figure 1.5: One of the site visit.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Ranhill SAJ Sdn Bhd, an auxiliary of Ranhill Utilities Berhad is an incorporated water supply company or organization, engaged with the course of water treatment and circulation of treated water to consumers straight up to charging and assortment in Johor. The headquarters is located at Bangunan Ranhill SAJ, Jalan Garuda, Larkin, 80350 Johor. This company, Ranhill Utilities were founded or established in years of 1994 and the director who managed this company is Tan Sri Hamdan Mohamad, the highest director of boards. But the CEO of the Ranhill SAJ is Nor Ifuan Md Nor who constantly manage every single process or progress of water supply of Johor in Ranhill SAJ. This company is formerly known as **Jabatan Bekalan Air Johor (JBAJ)** a water supply department owned by the Johor state government. SAJ was established on 1994 under the Malaysian Companies Act 1965 and now as Ranhill SAJ (RSAJ) after the rebranding as a new name at September 2018.



Figure 2.1: The satellite view of headquarters Ranhill SAJ

Source: Google Maps (2020).

2.2 Company Profile



Ranhill Utilities Berhad is a Malaysian conglomerate with interests in environment and force areas. In the environment area, it gives and provide water supply administrations, works water and wastewater treatment plants, and offers particular types of assistance in the administration and improvement of water utility resources. In the environment business, Ranhill has been conceded a selective permit by the Minister of Energy, Green Technology and Water, Malaysia to give source-to-tap water supply administrations to end-clients in the whole State of Johor, the second most crowded state in Malaysia, with a populace of around 3.5 million individuals. With this conceded SAJ has joined Ranhill as one company and become Ranhill SAJ.

Before it becomes Ranhill SAJ, this company which supply water in state of Johor are known as JKR water supply until March 2009 they were having new regime or migration for restructuring of Johor water supply and become Syarikat Air Johor (SAJ). Based on the figure 2.2 shows that on November 2017 SAJ had rebranding their name as SAJ Ranhill Sdn Bhd then changed into Ranhill SAJ on 12 September 2018 until now.

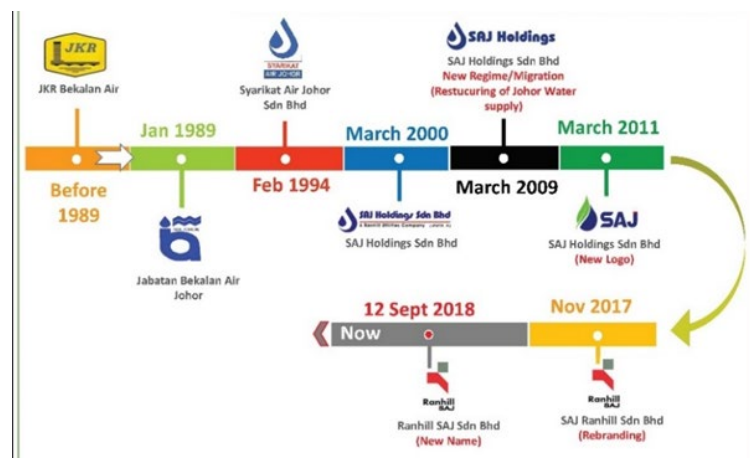


Figure 2.2: The chronology of rebranding the RSAJ

Ranhill SAJ also one of an important role to every development or construction project. This is because Ranhill SAJ is a water supply company which it is a must and important thing to be considered. They are also one of the organizations that know every single detail of utilities especially water pipe under the ground or over the ground. To develop any project such as residential area will have a lot of water consumer and also needs a suitable place to work on the development project. As a conclusion, the organization makes predictable and client well-disposed strides in reinforcing the organization's administration with a solid administration arrangement with the strength of a line of representatives with broad involvement with their individual fields as per the necessities and tastes of clients towards developing quality and best work.



Figure 2.3: The Headquarters of RSAJ in Larkin.

2.3 Company Organization Chart

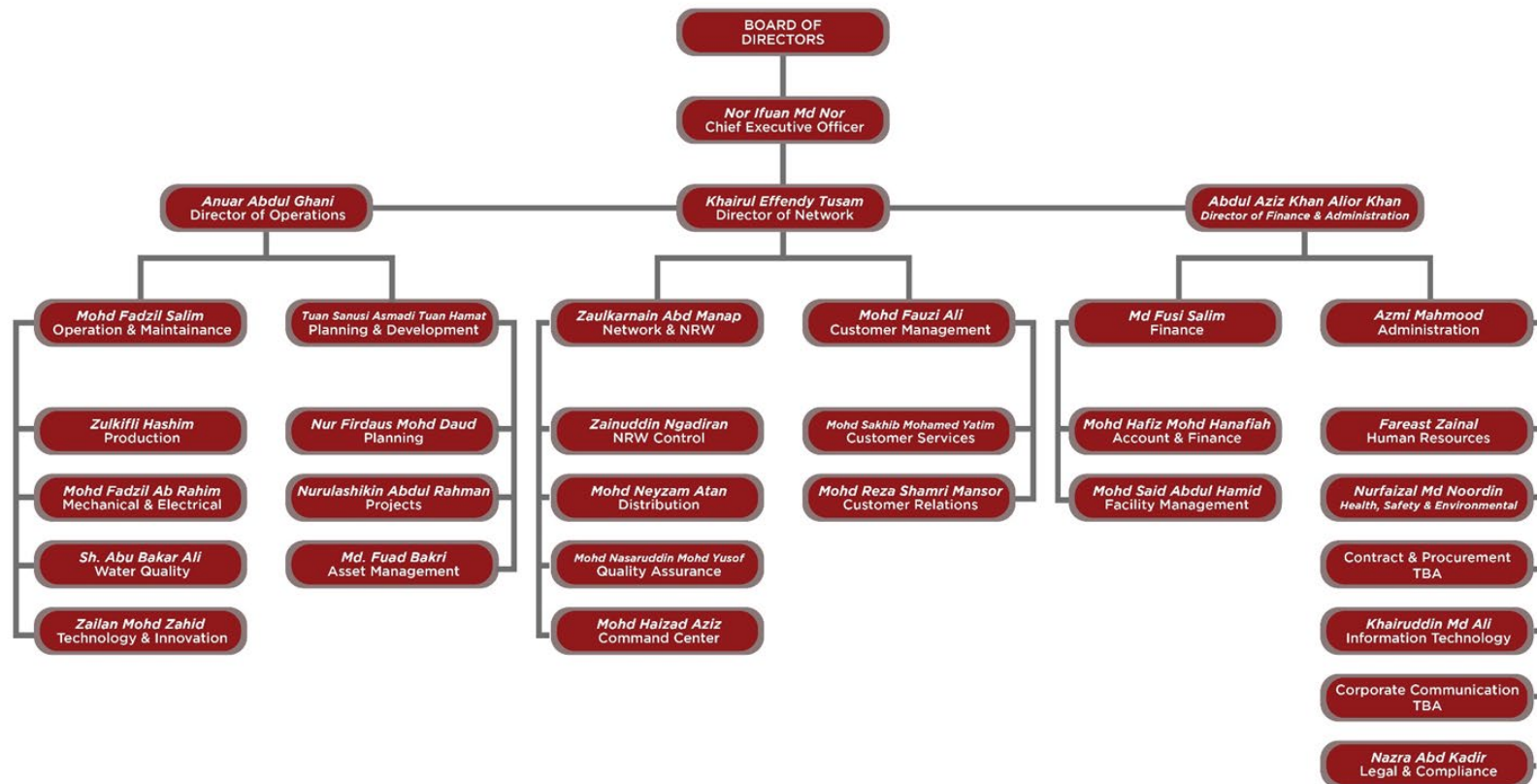


Chart 2.1: Organization Chart of Ranhill SAJ Sdn Bhd

2.4 List of Project

2.4.1 Completed Project

Table 2.1 List of Completed Project

No.	Project Tittle	Project Value	Start Date	Completion Date	Contractor Involved
1.	Proposed refurbishment and repair of admin building No. 1 & 2 and associated works at Sri Gading Lab for SAJ Holdings Sdn. Bhd.	RM 470,808.80	28 February 2015	23 March 2016	MNA Inegrated Resources (M) Sdn Bhd
2.	Proposed renovation work of a temporary office space for 'Info Centre' at Ranhill Sdn. Bhd office.	RM 47,112.00	02 Jun 2020	30 July 2020	A Zack Engineering & Construction
3.	Proposed works for relocate for temporary office space of SAJIC to existing SAJIC and relocate office space of existing SAJIC to temporary office space of SAJIC.	RM 71,000.00	02 October 2020	07 November 2020	A Zack Engineering & Construction
4.	Proposed renovation and interior design work of a command centre and executive office at Ranhill SAJ headquarters, Jalan Garuda, Larkin, Johor Bahru, Johor	RM 7,560 167.64	21 September 2020	07 February 2021	Manik Global Sdn. Bhd.

2.4.2 Project Ongoing

Table 2.2 List of Project Ongoing.

No.	Project Tittle	Project Value	Start Date	Completion Date	Percentage of Progress	Contractor Involved
1.	Proposed works to improve the high priority distribution system for the Iskandar region of Malaysia	RM 32,000,000.00	25 March 2021	24 September 2022	9.61%	RFS Cekal Sdn Bhd
2.	Proposal to upgrade the new water supply scheme in the province of Iskandar	RM 166,500,000.00	03 June 2020	2 June 2022	35.72%	LLC WET JV Sdn. Bhd.
3.	Proposed works to improve the high priority distribution system in the Iskandar region of Malaysia	RM 32,000,000.00	25 March 2021	24 September 2022	12.91%	RFS Cekal Sdn Bhd

CHAPTER 3.0

CASE STUDY

3.1 Introduction to Case Study

This report containing a project which is The Construction Work of Elevated Water Storage Tank as the title given for this report. Basically, this project works to improve a high priority distribution system in the Iskandar region of Malaysia. Ranhill SAJ are one of the responsible parties on leading this project to be finished on time. Besides that, this project contains a few things to construct such as sub-station of Tenaga Nasional Berhad (TNB) for electrical purpose, suction tank, pump house, and the main focus for this report is the elevated water storage tank that were constructed for water distribution system. The project uses various kinds of heavy-duty machinery such as backhoe, drag line, pile driving equipment and few more.

The value stated on the contract for the whole project is RM 32,000,000.00 and being expected or estimated to complete on September 2022. Furthermore, the site location is located at Taman Abad, Tebrau, Johor as mentioned on the title of the report. This project involving many parties such as the employer is Pengurusan Aset Air Berhad (PAAB), Ranhill SAJ as water operator, HSS Intergrated Sdn Bhd as engineering consultant, MF Associates Sdn Bhd as quantity surveyors and the last one is main contractor is RFS Cekal Sdn Bhd.



Figure 3.1: The site project from satellite view

(Source: Google Maps)



Figure 3.5: View of the project at 7% progress.

3.0 LAYANGKASA DISTRIBUTION SYSTEM – KEY PLAN

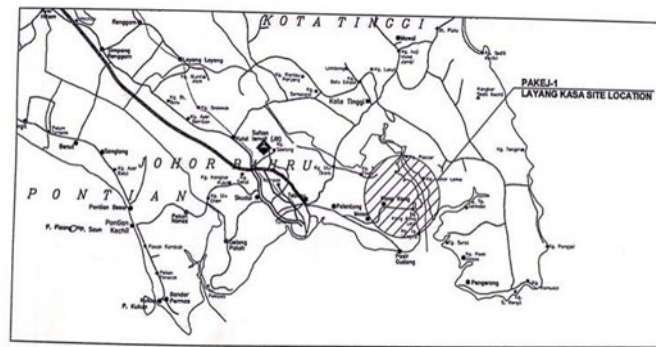


Figure 3.6: Key plan.

2.0 TEBRAU SYSTEM DISTRIBUTION – LAYOUT PLAN

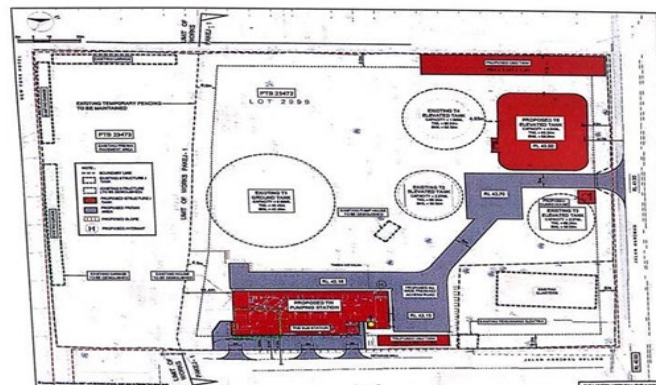


Figure 3.7: Layout plan.



Figure 3.8: A bulldozer one of the machineries used

3.2 The Method Used in Constructing of an Elevated Water Storage Tank

3.1 Slump Test for Casting

First, the Yue Whatt Trading Sdn Bhd ready-mix concrete lorry will arrive at the job site at Jalan Harimau, Taman Abad, Tebrau. Before being poured out to the ground for the following procedure, the concrete in the lorry will be thoroughly mixed. In other words, the consistency and workability of this new concrete will be assessed. The slump test is what it's called.



Figure 3.9: The placing of fresh concrete in the mold

For the initial layer, fresh concrete that has been poured on the ground will be poured into the mold with a trowel. Then, using a typical 16 mm diameter rod, tamp it 25 times on the initial layer. The second layer of concrete was poured into the mold and tamped down with a rod for a total of 25 times. The third layer of concrete was applied after a thorough tamping, and the surplus concrete from the previous layer was removed with a trowel.



Figure 3.10: Measuring the slump using a measuring tap

Lastly, the cone will be lifted upward properly and the cone lifting angle must be 90 degrees ahead. The value of the slump was noted with the help of measuring tape.

3.2 *Quality Inspection of Materials and Fittings.*

Ranhill SAJ are responsible to do the quality inspection of materials and fittings for the pipe. This inspection was conducted by the authority person from Ranhill SAJ which is En.Ismail Bin Tasrip the Technical Service who has a lot of experience in this industry. Besides that, this inspection is conducted to test the thickness of the pipe that will be use as the distribution system from the elevated water storage tank to all the consumers through the gravity. To do the inspection an equipment named Ultrasonic Thickness Gauge were used to read the thickness if the pipe complies with the requirement from Suruhanjaya Perkhidmatan Air Negara (SPAN). The result of this test is stated in Borang Permohonan Pemeriksaan that was prepared by Ranhill SAJ.



Figure 3.11: The Ultrasonic Thickness Gauge



Figure 3.12: Pipe testing.

RANHELL SIA Sdn. Bhd.
BORANG PERMOHONAN PEMERIKSAAN

Projek: *Projek Bina*
Alamat: *Lot 101, Jalan...*

NO. BILANGAN PERMOHONAN

1.0 Objektif Pemeriksaan:
 Pemeriksaan Kualiti Bahan Papan dan Filling
 Pemeriksaan Kualiti Bahan MBE
 Pemeriksaan Kualiti Kerja Di Tapak
 Pemeriksaan Kualiti Kerja MBE
 Pemeriksaan Keselamatan, Kesehatan dan Persekitaran Tapak

2.0 Butiran Projek:
 No. Bilangan: *...* Daerah: *...*
 Nama Projek: *...*
 Pengerusi: *...* No. Telefon: *...*
 Pengarah: *...* No. Telefon: *...*

3.0 Lokasi:
 Papan Lantai No. Papan: *...*
 Papan Dinding No. Papan: *...*
 Papan Binaan No. Papan: *...*

4.0 Nama Pemilik: *ISMAIL BIN TASRIP*
 No. Telefon: *...*

5.0 Nama Penyelia: *...*

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Figure 3.13: Borang Permohonan Pemeriksaan

3.3 Construction for Pile Cap Foundation

Concrete piles are made with reinforced concrete cement is a primary component of a deep foundation, and is upward driven or drilled profound into the ground at the building site. Concrete Piles are phenomenal material utilizing for pile foundation these days since concrete cement has great compressive strength.

From what that have been observed in the site construction, casting of the pile has been done 7 days before the first site visit. So, the next step is to construct the pile cap for the foundation. Since it has been 7 days after the casting of the piles that has been done through cast-in situ method, the pile will gain approximately 70% of its compressive strength. Then, excavation around the piles has started which soil around piles has been removed to the required levels and dimension that allows construction of the pile cap



Figure 3.14: The excavation around pile

Next, the pile head cutting which the concrete will be removed up to cut off level. Those pile are free from cracks and unsound concrete and has been repaired. After completion of concrete cutting for piles, the progress has stopped at stage where blinding concrete shall be cast for the next step of constructing the pile cap foundation.

Because of that the site supervisor has explained the next procedure for cap blinding concrete in next week which is soil will be removed and leveled to the formation level. The formation blinding concrete has to be compacted properly and tested for field density test. This step is to blind the concrete with two layers of polyethylene and will be cured for a minimum 24 hours. To forestall groundwater entrance from pile cap base. It is prescribed to waterproof pile cap blinding particularly in spaces of the great water table and harsh climate.



Figure 3.15: The cutting of the pile

3.3 The Investigation of The Project Details.

Every single detail and progress of the project has been made in a one file of document, so that it can be easy to be refer for everyone who involved in this project. Through this document, it can be so easy to know every important part of this project such as summary of contract that include project tittle, contract number and sum, employer, water operator, engineering consultant, quantity surveyor or consultant, main contractor and many more.

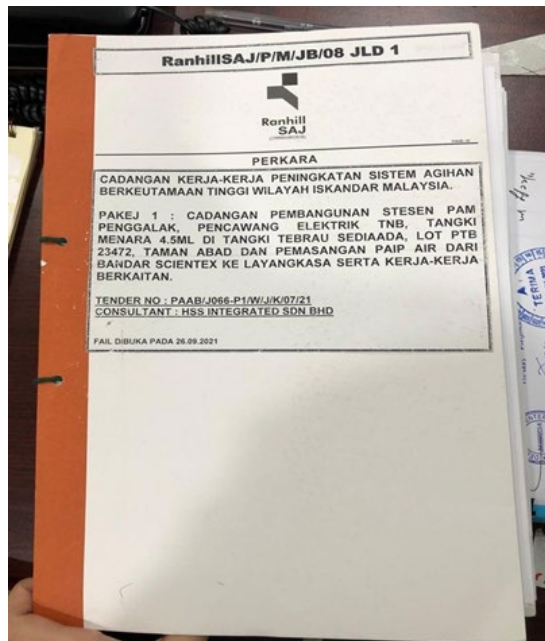


Figure 3.16: The front page of document project.

Furthermore, while doing a review through this document all of the details of progress in this project were stated in specifically. Based on the statement in the document, actual overall physical progress of this project has done in about 10.99% on September 2021 and 12.91% of actual overall financial progress. Besides that, this document also contains the information scope of work, drawing plan, summary of testing, project organization chart and others. All of them, are basically an important part of the project that has been stated in the document by a responsible person that handling this project from Ranhill SAJ.

SUMMARY OF CONTRACT

1.0	Project Title	Cadangan Kerja Kerja Peningkatan Sistem Agihan Berkeutamaan Trogi Raji Wilayah Iskandar Malaysia
2.0	Package	Fase 1 - Cadangan Pembangunan Stesen PAM Pengalakan, Pencawang Elektrik TND, Tangki Memara 4.54M, Di Tangki Tebrau Sedada, Lot PTB 23472 Taman Abad Dan Pemasangan PAM Air Dari Bandar Scientex Ke Layangkasa Serta Kerja-kerja Berkaitan.
3.0	Contract No.	PAAB/066-P1WU/07/21
4.0	Contract Sum	RM52,000,000.00
5.0	Employer (P/C)	Pengurusan Aset Air Berhad (PAAB) 24th Floor, Menara Multi Purpose Capital Square 8, Jalan Menara Juita 50100 Kuala Lumpur. Tel: 03-2614 5555; Fax: 03-2614 5588 Contact Person : En Mohd Fuzil Bin Omar (Project Management Division) Superintendent Officer : En Zukhrif Omar
6.0	Employer (JCHOR)	Pengurusan Aset Air Berhad (JCHOR) No. 2-02, Jalan Idaman 2, Taman Larkin Idaman 80300 Johor Bahru Tel: 07-221 7055; Fax: 07-221 7255 Contact Person : En. Khamsiah/Muhammad Rozaidi Manjanib
7.0	Water Operator	Ranhill SAJ Sdn Bhd Jalan Gerudu, P.O. Box 262 80350 Johor Bahru Tel: 07-244 4340; Fax: 07-224 2990 Contact Person : En. Nurulshahin Bin Abdul Rahman
8.0	Engineering Consultant	HSS INTEGRATED SDN BHD B1 (1-4) Block B, Plaza Datarak, No. 21, Jalan S/106, Bandar Sri Pemasari, 50000 Kuala Lumpur. Tel: 03-9173 2355; Fax: 03-9173 2355 Contact Person : Ir Mohd Zubir Bin Jaafar
9.0	Quantity Surveyors / Consultant	MF ASSOCIATES SDN BHD No. 49, Jalan Elok Jering 1315, Sekayen 13, 40100 Shah Alam Selangor Darul Ehsan. Tel: 03-5511 0400; Fax: 03-5512 0400 Contact Person : Sr Marham Bin Mustafa
10.0	Main Contractor	PKS CORKAL SDN BHD No.8-1, Jalan SP 53, BSP Village, Bandar Saujana Putra, 42810, Jenjarom Selangor Darul Ehsan. Tel: 03-51035855
11.0	Project Site Office	No. 30-02, Jalan Sri Pelangi 4, Taman Pelangi 80400, Johor Bahru, Johor.
12.0	Letter of Award Date	8th March 2021
13.0	Date of Commencement	29th March 2021
14.0	Date of Completion	24th September 2022
15.0	Contract Period	19 Months

Figure 3.17: Summary of the contract.

28.0	Extension of Time	-Nil-		
29.0	Variation Order	-Nil-		
30.0	Total Payment to Date	15/09/2021	RM1,463,322.13	
31.0	Work Progress	Month	Aug-21	Sep-21
		Overall Physical Progress	Planned	7.12%
		Actual	7.43%	10.99%
		Ahead (Delay)	0.31%	0.05%
	Overall Financial Progress	Planned	8.78%	12.81%
		Actual	9.61%	12.61%
	Ahead (Delay)	0.83%	-0.30%	

Figure 3.18: The progress of project.

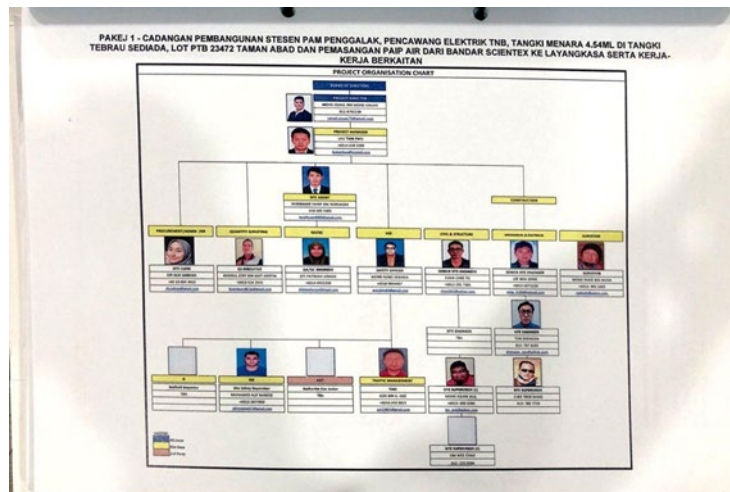





Figure 3.19: The project organization chart.

3.4 Problems or Issues Encountered During the Construction of Elevated Water Storage Tank

Table 3.1 Shows problems and issues encountered

No	Problem/Issues	Solution	Description
1.	Weather condition such as rainy day in about 2-3 times a week has caused the foundation filled with water that construction works obstructed.	Water pump or construction dewatering pump will be used to flash out the water.	<p>✓ Problem/Issues Solved</p>  <p><i>Figure 3.20: The foundation.</i></p>  <p><i>Figure 3.21: The water pump</i></p>

2.	Notice for night work or overtime work to commence earthwork shall require approval 'Pelan Bangunan' prior to the commencement of the works. to Majlis Bandaraya Johor Bahru (MBJB).	Submission of Borang B to MBJB as requested from main contractor, RFS Cekal and make payment to MBJB on application for Permit Kerja Malam.	✓ Problem/Issues Solved
3.	There is a misunderstanding between main contractor, engineering consultant, and other team management project.	Do a meeting or discussion which involving the responsible person in this project to discuss the problem or misunderstanding encountered between them and find the solution as soon as possible so that the project will not have any delay.	✓ Problem/Issues Solved  <p><i>Figure 3.22: Shows the discussion</i></p>

3.5 Difference Between Elevated Water Storage Tank and Non-Elevated Water Storage Tank

This project types of water tank are Gravity and Pump Combination System which only need only small pump with flat rate performance and the consumers location is lower than the water storage tank level. In addition, water being pump to the water storage at high level tank and distributed through gravity.

Table 3.2 Shows difference between elevated and non-elevated water tank

Elevated Water Storage Tank	Non-Elevated Water Storage Tank
<ul style="list-style-type: none"> Do not require the continuous operation of pumps. 	<ul style="list-style-type: none"> Require the continuous operation of pumps.
<ul style="list-style-type: none"> Since the pressure is maintained by gravity, it will have no effect on the distribution system. 	<ul style="list-style-type: none"> The distribution system will be delayed or affected.
<ul style="list-style-type: none"> Above ground water level 	<ul style="list-style-type: none"> Below or same with ground water level

Table 3.3 Shows the advantages and disadvantages of elevated water tank.

Types of Tanks	Advantages	Disadvantages
Elevated Water Storage Tank	<ul style="list-style-type: none"> Repairs and maintenance are considerably easier to acquire by. Ease of installation and expansion Required less space 	<ul style="list-style-type: none"> Pressure is difficult to control

<p>Non-Elevated Water Storage Tank</p>	<ul style="list-style-type: none">▪ Pressure is easy to control▪ Remedial action can speedily take.	<ul style="list-style-type: none">▪ Required a larger space▪ Problems associated with operation and maintenance of pumping systems
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CHAPTER 4.0

CONCLUSION

Taking everything into account, all water tank needs to follow the code of training when planning, designing and implementing water distribution system which is Water Service Industry Act of 2006, and the Water Service Industry (Water Reticulation and Plumbing) Rules 2014. Elevated water storage tank is one of the types of water tank that have in this water distribution system. Basically, water tanks are utilized to give stockpiling of water to use in numerous applications, drinking water, water system agribusiness, fire concealment, rural cultivating, both for plants and animals, compound assembling, food preparation just as numerous different employments. Water tank parameters incorporate the overall plan of the tank, and decision of development materials, linings. In this project, the chosen types of water storage tank are the elevated tank which does not require the continuous operation of pumps. Moreover, this water tank is constructed to distribute water to all the consumers in the surrounding area based on the demand at Taman Abad, Tebrau. Ranhill SAJ as the party who in charge as the water operator and working together with Pengurusan Aset Air Berhad (PAAB) in order to update the entire progress of the project. It is proven that Ranhill SAJ is a trusted company that has extensive experience in this field. Most of their project are valuable and involving a company who has good achievement. Besides that, this report is focusing on the method used in the implementing the water tank through the case study at the construction site in Tebrau, Johor. In development industry particularly dealing with this venture, there are a great deal of issue that will be looked on during the development work of elevated water storage tank like the misconception between the laborers. In any case, every one of the issues that happen need a superior answer for ensure that this undertaking will complete the process of as per the given date. Finally, the s elevated water storage tank likewise enjoys their own benefits and hindrances that can influence the project yet in addition can bring a decent characteristic for it.

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Arthur S. Milinowski. The advantages and Disadvantages of Elevated Concrete Tanks for Water Storage. 10(4):571-577

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APPENDIX

MISSION & VISION



Vision

To become a world class water utility company.

Mission

We shall continuously satisfy our customers and stakeholders by optimizing available resources and delivering quality services.



AWARDS & RECOGNITION

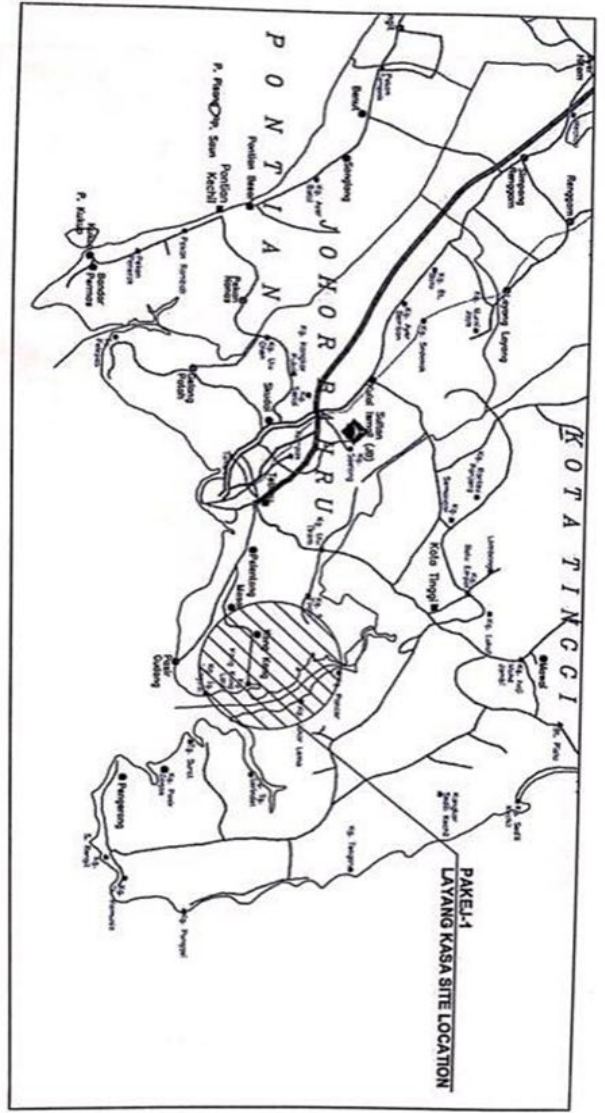


No.	Anugerah & Pengiktirafan	Year
1	Penerima Anugerah Persatuan Air Malaysia untuk Keunggulan dalam Pengurusan Air dan Kecekapan Operasi	2005
2	Pengiktirafan oleh Bank Dunia sebagai Pusat Latihan operasi, penyelenggaraan & pengurusan bekalan air	2005
3	Ranhill SAJ memenangi kategori Amalan Tempat Kerja Terbaik dalam Anugerah Tangungjawab Sosial Korporat Asia untuk Projek Iklim Organisasi Six Sigma.	2005
4	Loji operasi dan rawatan Ranhill SAJ dipertakui ISO 9001: 2000, dengan itu memastikan kualiti tertinggi dalam semua yang kami lakukan. Makmal Pusat Ranhill SAJ kini ditauliahkan kepada ISO / IEC 17025.	2005
5	Tan Sri Hamdan Mohamad, Presiden Ranhill SAJ Sdn Bhd menerima Anugerah Kecemerlangan Pengurusan Asiwater untuk kategori individu.	2008
6	Tempat Pertama untuk Kategori Organisasi Berpotensi dalam Anugerah GEKO.	2008
7	Memenangi Sijil dalam Pengurusan Pengetahuan semasa Anugerah GEKO.	2008
8	Kategori Organisasi Amalan Terbaik dalam Pencapaian Global pada Anugerah Global Emerging Knowledge Organisation (GEKO) ke-5 2009.	2009
9	Memenangi Anugerah Kecemerlangan Pengurusan Perubahan di Anugerah Pengurusan Kecemerlangan Global 2013 (GEMA)	2013
10	Syarikat Terbaik Untuk Bekerja di Asia yang dianugerahkan oleh HR Asia	2014
11	Tempat ketiga untuk MYCarbon Awards 2014 anjuran Kementerian Sumber Asli & Alam Sekitar.	2014

CADANGAN KERJA-KERJA PENINGKATAN SISTEM AGIHAN BERKEUTAMAAN TINGGI BAGI WILAYAH ISKANDAR MALAYSIA

PAKEJ 1 - CADANGAN PEMBANGUNAN STESEN PAM PENGALAK, PENCAWANG ELEKTRIK TNB, TANGKI MENARA 4.54ML, DI TANGKI TEBRAU SEDIADA, LOT PTB 23472 TAMAN ABAD DAN PEMASANGAN PAIP AIR DARI BANDAR SCIENTEX KE LAYANGKASA SERTA KERJA-KERJA BERKAITAN

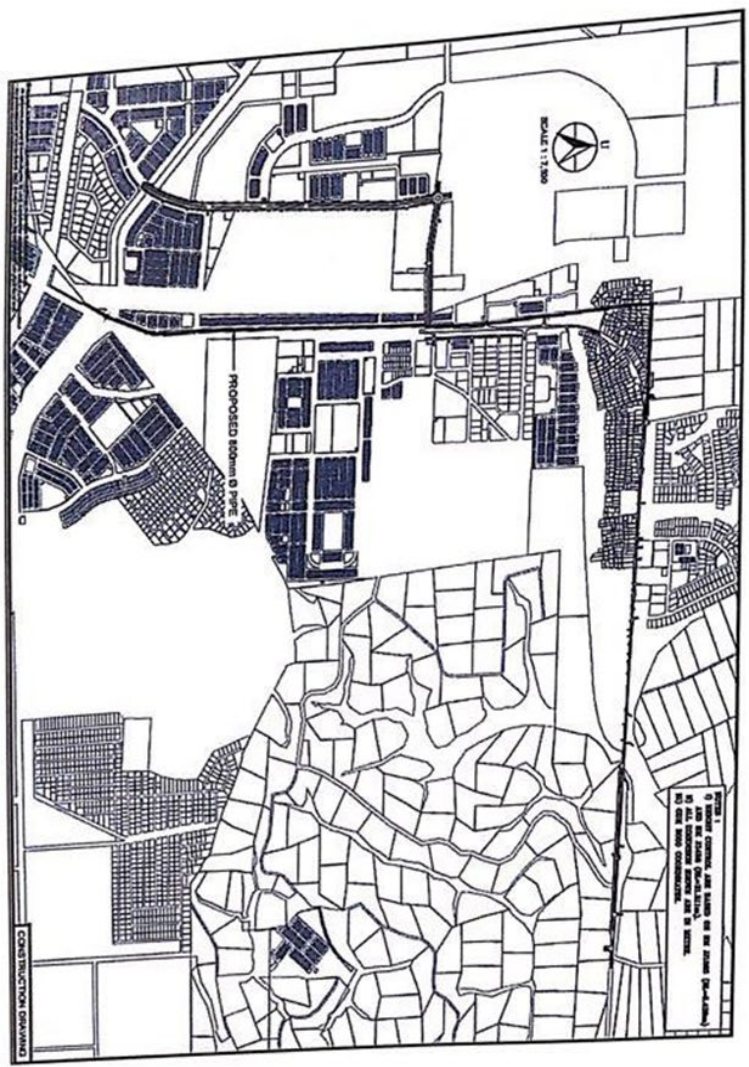
3.0 LAYANGKASA DISTRIBUTION SYSTEM - KEY PLAN



CADANGAN KERJA-KERJA PENINGKATAN SISTEM AGIHAN BERKEUTAMAAN TINGGI BAGI WILAYAH ISKANDAR MALAYSIA

PAKEJ 1 - CADANGAN PEMBANGUNAN STESEN PAM PENGALAK, PENCAWANG ELEKTRIK TNB, TANGKI MENARA 4.54ML DI TANGKI TEBRAU SEDJADA, LOT PTB 23472 TAMAN ABAD DAN PEMASANGAN PAIP AIR DARI BANDAR SCIENTEX KE LAYANGKASA SERTA KERJA-KERJA BERKAITAN

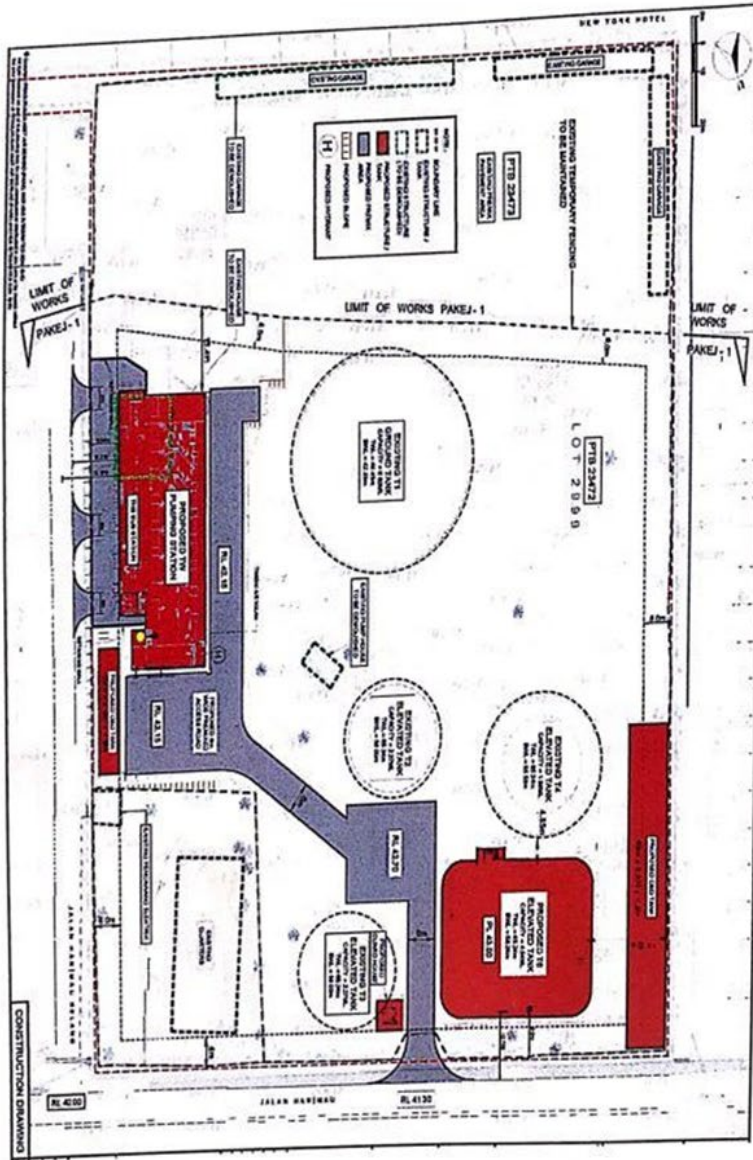
4.0 TEBRAU SYSTEM DISTRIBUTION - LOCATION PLAN

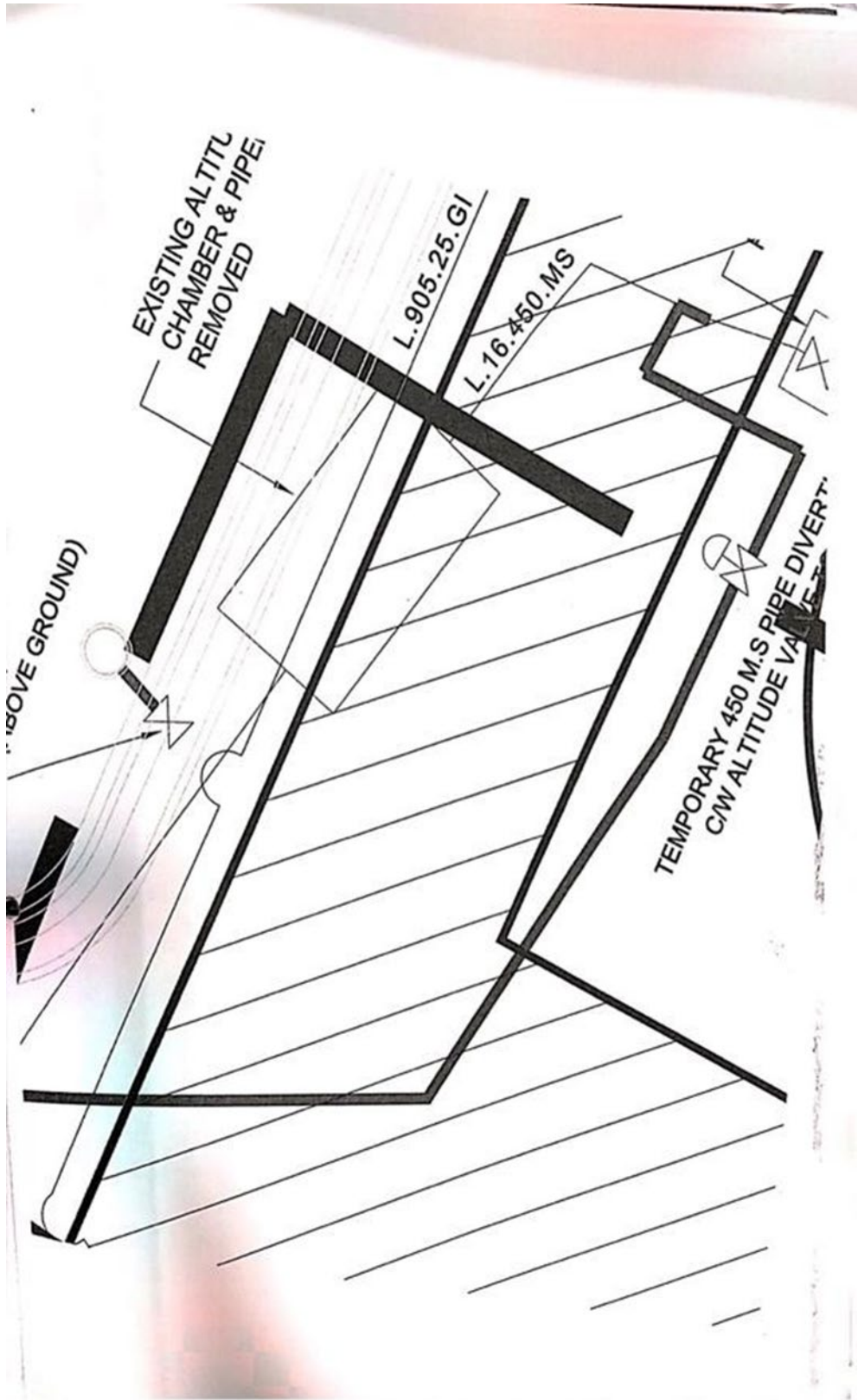


CADANGAN KERJA-KERJA PENINGKATAN SISTEM AGIHAN BERKUTAMAM TINGGI BAGI WILAYAH ISKANDAR MALAYSIA

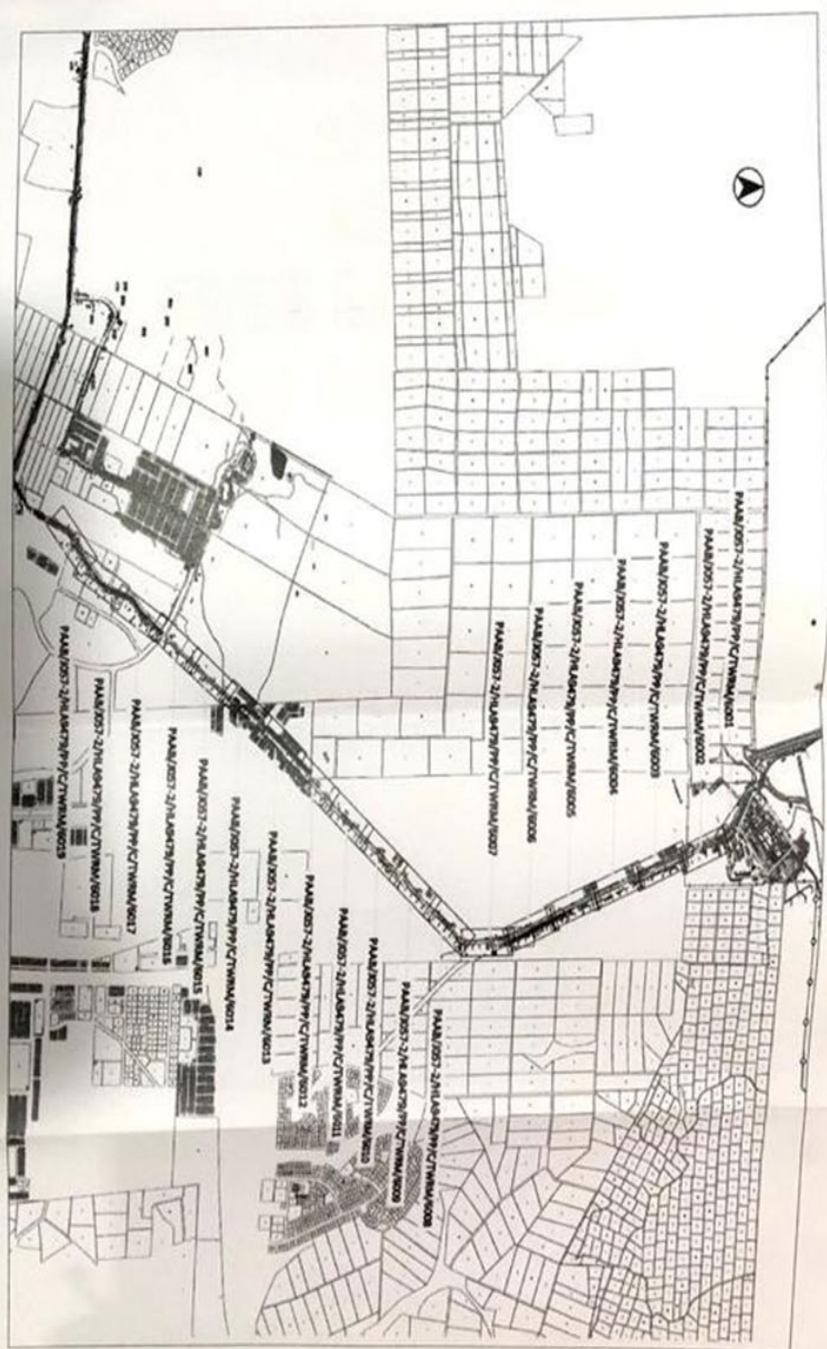
PAKEJ 1 - CADANGAN PEMBANGUNAN STESEN PAM PENGALAK, PENCAWANG ELEKTRIK TNB, TANGKI MENARA 4.54ML DI TANGKI TEBRAU SEDIADA, LOT PTB 23472 TAMAN ABAD DAN PEMASANGAN PAIP AIR DARI BANDAR SCIENTEX KE LAYANGKASA SERTA KERJA-KERJA BERKAITAN

2.0 TEBRAU SYSTEM DISTRIBUTION - LAYOUT PLAN





PROJECT LAYOUT





NO. SIJIL (Certificate No.)

SPAN/BPI/3176-2020

SURUHANJAYA PERKHIDMATAN AIR NEGARA SIJIL PERAKUAN PENDAFTARAN PEMBEKAL (SUPPLIER REGISTRATION CERTIFICATION)

Adalah dengan ini diperakui bahawa syarikat dan produk seperti yang tercatat di bawah telah berdaftar dengan Suruhanjaya Perkhidmatan Air Negara bagi kegunaan industri perkhidmatan air di negeri-negeri Semenanjung Malaysia serta Wilayah Persekutuan Putrajaya dan Labuan sahaja.

(This is to certify that the following company and product have been registered with Suruhanjaya Perkhidmatan Air Negara to be used in the water services industry in Peninsular Malaysia and Federal Territory of Putrajaya and Labuan only.)

No. Rujukan Pendaftaran
(Reference of Registration No.)

SPAN/BPI/300-10/187/BW-2

Nama dan Alamat Syarikat
Pembekal
(Name and Address of Supplier)

MCFLO TECHNOLOGIES SDN BHD
NO. 7 JALAN INDUSTRI USJ 1/7 TAMAN PERINDUSTRIAN USJ 1 47600
SUBANG JAYA
SELANGOR DARUL EHSAN

MAKLUMAT PRODUK ATAU SISTEM (PARTICULARS OF PRODUCT OR SYSTEM)

Kategori
(Category)

B - FLOW CONTROL

Nama Produk atau Sistem
(Product or System Name)

CENTRIFUGAL PUMP

Perihal Produk atau Sistem
(Product or System Description)

Model: 300-10-187-BW-2. Rujuk spesifikasi model dan spesifikasi di lampiran A

Jenama
(Brand Name)

DANFLO

Piawai
(Standard)

ISO 9001:2015, ISO 14001:2015

Kegunaan
(Application)

Sistem Irigasi Pertanian

Nama dan Alamat Pembuat
(Name and Address of Manufacturer)

SHANDONG SHANGYONG JIN STEEL
NO. 6, DONGXIN ROAD, WUHECHU PROVINCE LEVEL TOURIST RESORT,
WEIHAI SHANDONG, P.R. CHINA

Nama dan Alamat Prinsipal
(Name and Address of Principal)

SUBMERSIBLE MOTOR ENGINEERING PTY. LTD. (DANFLO PUMP)
9, RYELANE STREET, MADDINGTON, WESTERN AUSTRALIA 6109,
AUSTRALIA

Sah Sehingga
(Valid Until)

31 Dec 2021

Sijil yang dikeluarkan adalah tertakluk kepada SYARAT-SYARAT AM (Bahagian A) dan SYARAT-SYARAT KHUSUS (Bahagian B).

(The Certificate issued is subject to the GENERAL CONDITIONS (Section A) and SPECIFIC CONDITIONS (Section B).)

(DATO' AHMAD FAIZAL BIN ABDUL RAHMAN)
Ketua Pegawai Eksekutif
Suruhanjaya Perkhidmatan Air Negara (SPAN)

Tarikh Dikeluarkan
(Issue Date)

06 Jan 2020