



DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

**METHOD INSTALLATION OF PRECAST CONCRETE PILE
USING HYDRAULIC INJECTION (JACK-IN PILE)
SYSTEM**

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(PERAK)

DECEMBER 2018

It is recommended that report of this practical training is provided

By

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Entitled

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SYSTEM**

accepted in partial fulfilment of requirement has for obtaining 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 here in, during the practical training session that I been given by the company at AD MUTIARA SDN BHD for duration of 12 weeks starting from 3 September 2018 and ended on 3 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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In the end, special thanks to my classmate who help me a lot with some other opinion and suggestion involving this report. Last but not least, I have to appreciate the guidance given by them as well as the panels especially in this report that really improved my working skills and supportive comment and advices

Thank you so much.

ABSTRACTS

Piling work foundation is one of a crucial part in element of the structure of a building construction, therefore this report will discuss about the method of piling work for the foundation process of the below structure. In this report, we have made the new propose of Administration building at SMK Seri Sendayan as the case study. The purpose of this report is to reveal the process of pile installation by using Hydraulic Jack-In machine to install the precast pile into the below structure through injection system. The main objective for this report is to focus on the process of Jack-In pile injection system. Beside of that it also to determine the reason this method of installation is used based on the characteristic of the soil. Finally, to identify the machineries and tools used throughout this piling installation. This report will show how this method could provide a smooth working process and environmental friendly use as its not produce unwanted sound to surrounding. This report could prove it that this Hydraulic Jack-In Piling method of installation system is useful as a modern way to construct a building foundation that could fulfil some of the building criteria and produce a safe and strong building structure that is demand by the client.

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CHAPTER 1.0

1.0 INTRODUCTION

Jack-In piling method is one of the methods of installation precast concrete in construction. The jack-in piling system is a relatively modern deep foundation piling system where dead weights are used to exert pressure to drive piles into the ground.

The jack-in piling system is classified as a displacement pile system whereby soil is displaced during the driving process. When the piles are hydraulically jacked into the ground, the displacement causes the surrounding soils to compress against the jack-in piles resulting in an increased load-bearing capacity.

In Malaysia it been also been used widely because it is considered to being more environmental friendly compared to a conventional system, as this system eliminates excavation, as a result in lower volume of waste and higher cost savings in site clean-up.

This jack-in piling piling system is commonly used for medium loaded structures such as for residential or commercial buildings. Since the jack-in piling system does not produce as much noise or vibration as compared to other piling systems, it is most suitable and convenient to use for projects in urban areas where residents are sensitive to noise and vibrations.

Our project is being carried out at Sendayan. It is a new school building project that uses Jack-In piling method and it is different from its initial conventional method which is called the driven piles where this pile is driven using a hammer. This report concludes the way of installation until it is finish work done. To compare between these two methods by the advantages and disadvantages of Jack-In Piling and Driven using hammer method. Example, the advantage by using this type of piling is the duration of the project can be minimised as it used. For the disadvantage, this system is quite expensive compared to conventional method.

1.1 OBJECTIVE

The objective for this report is:

- To identify method of installation of pile.
- To determine the characteristic of soil in installation of pile by hydraulic injection.
- To identify the machineries and tools used in this piling installation.

1.2 SCOPE OF STUDY

Along this three months of industrial training at AD Mutiara Sdn Bhd. A lot of experienced and technical knowledge had been gained. The construction site that is in the early stage. The drive-In piling process by Hydraulic Jack-In piling precast of the building was cover up from the start and had been selected as the case study for this practical report.

Method installation process of Hydraulic Jack-In pile is the major scope that had been covered for this report by observing and analysing every aspect and process involved in this project. All tools and machineries been identified to support this case study. Every worker on site construction must being brief the function of each tool and machinery and must hold their own responsibilities in using all the equipment. Throughout the process of piling, several problems had been clarified been occur and the possible solution way for each problem had been identified after discussing with the team of main contractor and sub-contractor.

This report is provided with information regarding the first phrase to the final stage that had been carrying through on the driven pile cast with Hydraulic Jack-In system of administration building at SMK Seri Sendayan at Bandar Seri Sendayan. This process involves the planning and development activities associated with building construction and consists of two closely related processes.

1.3 RESEARCH METHOD

1. Observations

By given the opportunity to be placed at the site to supervise the work progress. The information of the process of piling works is gained through this method. To ensure this method stay in the memory and as a record, writing short notes and camera were applied. As example the arrangement of the piling bars also need to be took care to provide a smooth process to this work. Observing method was made from the beginning from the appearance of the Jack-In Piling Machine, the load machine for the machine and the crane until checking of the gridline based on the site plan by the Land survey.

2. Interviews

In order, to ensure the originality of the information, an interview session been made from the site supervisor, contractor, skilled workers and also the land surveyor on how the work process been done from the beginning to the end. All the information gained being taken into a short note. By this method, all the problems that usually occur along through the installation of precast pile could be avoided based on previous experience.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

AD Mutiara SDN.BHD. is a construction company that was invented by Mr. Haruddin Bin Thamby which now had been inherited to his son to continuing his legacy in this construction field. He is the owner of this company and also as the advisor for this company. His experience today under construction industry has reach 30 years full of hardship, rise and fall. Started from small bundle shop until his open his first G2 construction company and now becoming one of the successful company construction and civil work service in Seremban 2. Furthermore, this company is now in grade G7 which is the highest grade in construction and it shows that AD Mutiara is very great and well-known company in this field.

Their expertise covered all aspects of engineering and construction work including building maintenance work, general building works, civil engineering and mechanical and electrical work. In order to complete the market of construction industries nowadays, they are looking forward for the development project especially in residential and civil work specialist.

AD Mutiara is provide with a good and passionate worker in the company until they can reach to this good high level of construction company. Massive obstacle and hardship need to be face through in dealing with this field of work had choose them to become a success construction company. Serving a delighted service to grab the trust of their client is also one of the goals of AD Mutiara SDN.BHD.

2.2 Company Profile

Table 2.1 Company Profile

COMPANY NAME	AD MUTIARA SDN BHD
REGISTRATION NO.	488729-U
DATE AND PLACE OF REGISTER.	16th JULY 1999, KUALA LUMPUR, MALAYSIA
COMPANY ADDRESS	No. 592, JALAN HARUAN 4/8 OAKLAND COMMERCE SQUARE 70300 SEREMBAN, NEGERI SEMBILAN, DARUL KHUSUS, MALAYSIA
ISO REGISTRATION NO	AJAMY11/1377
NUMBER OF SHARE HOLDER	2
AUTHORIZED CAPITAL	MYR 5, 000,000.0
SHARED CAPITAL	MYR 1, 500,000.0
EMAIL	
TELEPHONE & FAX NO.	TEL : 06-630 7023
	FAX : 06-631 0704

2.3 Organization Chart

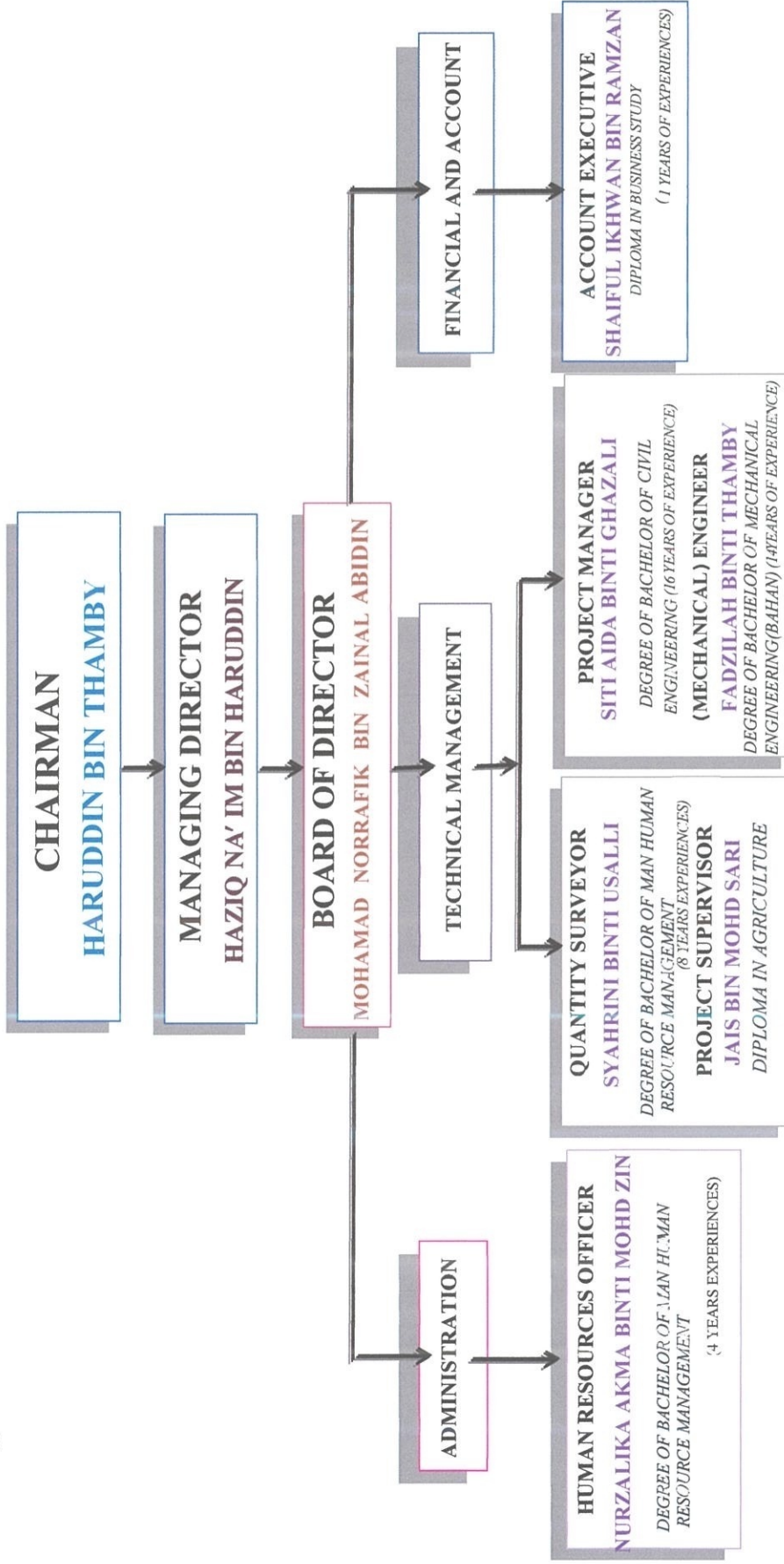


Figure 2.1 AD Mutiara SDN.BHD. Organization Chart

2.4 Listed of Projects

2.4.1 Completed Projects

Table 2.2 Completed Project

Item	Project Tittle	Client	Contract Value	Date Start	Date Finish
1.	Building and Upgrading of Village Road (Shortcut Road) From Kg. Baru Si Rusa To Taman Politeknik, Port Dickson , Negeri Sembilan Darul Khusus	Negeri Sembilan Public Works Department	MYR 12,931,744.28	10/12/14	13/1/17
2.	Works to Complete Site, Drainage System, 7 Unit of Operation House And 30 Units (3 Bay / Unit) Control Environmental Farming (CEF) And Related Works for Projects at TKPM Sendayan, Negeri Sembilan Darul Khusus	Ministry of Agriculture Malaysia Department of Agriculture Malaysia Wisma Tani Management Division	MYR 3,400,363.00	17/1/12	15/11/12
4.	Designing, Building and Completing Area Cleaning, Grass Planting, Developing Irrigation	Apt Equity Sdn. Bhd	MYR 19,864,185.00		

	Infrastructure and Related Works at Gemas National Feedlot Center, NSDK * Sub-contractor				
5.	Proposed Sports Infrastructure Development Project at SMK Zaaba, Kuala Pilah District, Negri Sembilan Container, Sports Track 400 Meters Type Synthetic And Upgraded Football Field	Malaysian Education Ministry Development Division	MYR 4,391,867.65	13/1/09	20/3/10

2.4.2 Ongoing Projects

Table 2.3 Ongoing Projects

Item	Project Tittle	Client	Contract Value	Date Start	Date Finish
1.	Construction of 8 Classroom replacement and other facilities at Smk Seri Sendayan, Negeri Sembilan Darul Khusus	Malaysian Education Ministry Development Division	MYR6,719, 403.60	28/1/17	11/11/19

CHAPTER 3.0

CASE STUDY

3.0 Introduction to Case Study

SMK Seri Sendayan does not have its own proper Administration building and Laboratory building for Chemistry, Physic and Biology subject. The principal decided to make a proposal to the State Ministry of Education on build up a new building for the Laboratory and Administration.

To ensure all the students to get all the utilities needed in get a smooth educational learning process, ministry of education has given the permission for constructing the new building. So, the drawing plan have been appointed to the JKR Architect to draw the new building and make the open tender advertisement.

Due to this issue, JKR has open up a tender document for this two new building under a project tittle:

"Construction of 8 classrooms and other facilities in SMK Seri Sendayan, Negeri Sembilan."

1. Addition 2 New block consisting of:

- a) Chemistry and Biological Laboratory Blocks -: 1storey**
- b) Administration blocks and classes -: 4 floors**

The initial completion date for this project is 11th November 2019 but there is a problem with this project that make it need to be change to 30th March 2020. In initial period it took 102 weeks. After a few discussions been made in the site meeting, our company had decided to ask for Extension of Time for the project. The request has been approved by the JKR and have been given 124 days extension from the initial date of the project.

The project is a Grade 6 project. It was a government tender and all this project has a cost of RM 6,719,403.60. This problem that has been through this project that cause to be delay for almost 2 months without progress. This is because of the government KL-Singapore High Speed Rail project, that unfortunately has pass through our administration building site area that made JKR had to relocate the site area to a new area. The process of redrawing by the architect also has took about 2 months to be prepared.

For this Administration Building project its use a Hydraulic Jack-In pile machine. The purpose of using this type of pile machine because it has been requested by the principal itself to avoid sound pollution. Conventional method of piling machine would give a very noisy sound that might be disturbing the students that will be taking SPM examination. Using this type of pile machine will give less noise sound to the student.

This is the site location from the google maps view. Our school is at Felda Seri Sendayan. This area is located in a interior area where the source facilities is quiet far away. The nearest facility is 2 km from the site area.

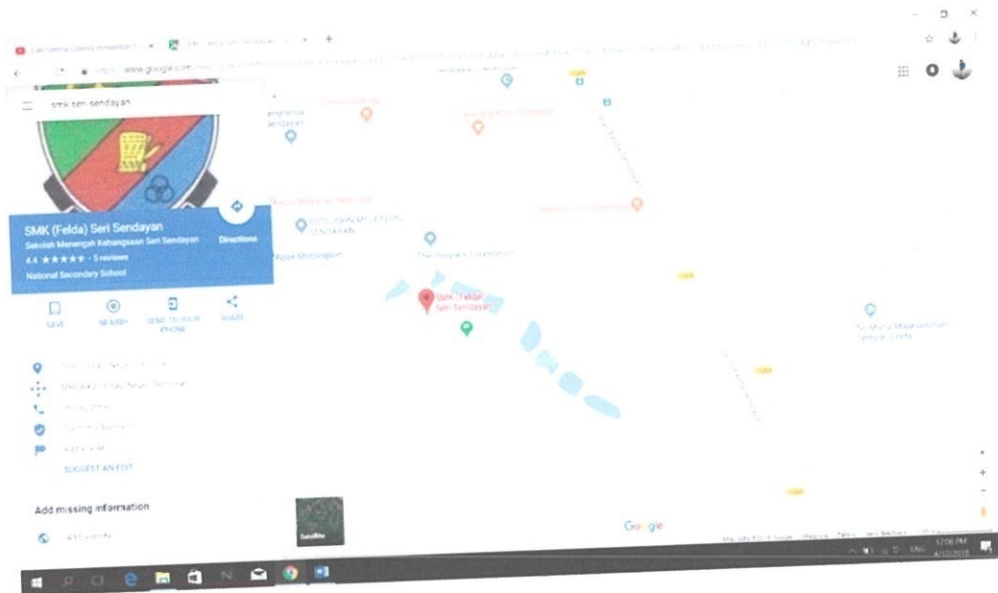


Figure 3.1 Site Location

This is our final site layout that been drawn by the architect, after a few months of correction because of a changing on the site area. The reason of this changes is because of the government railroad project been pass through our initial site area. We had to change the area of project at very last minute.

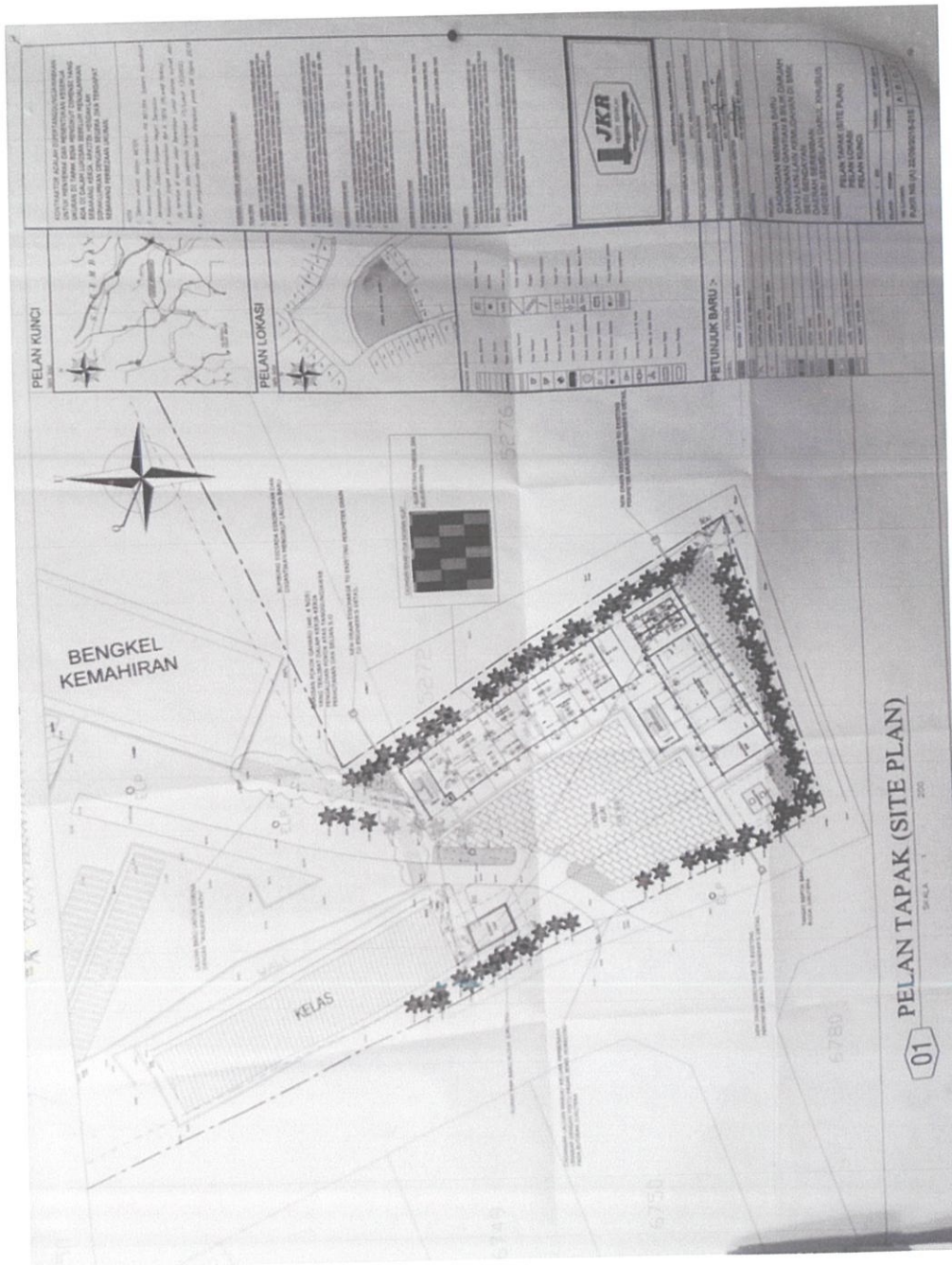


Photo 3.1 Site Layout for the administration building.

This is our structural drawing plan.

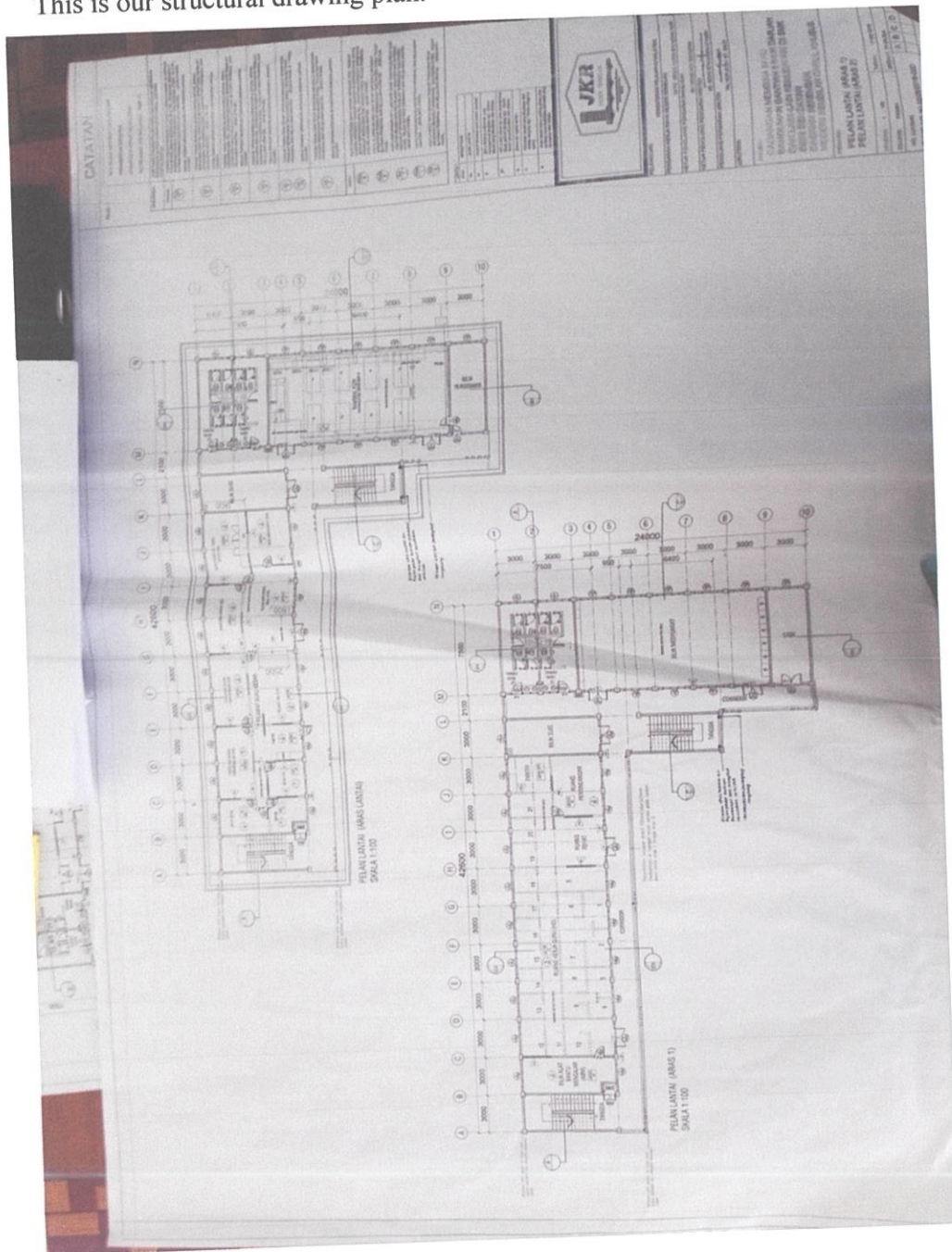


Photo 3.2 Structural Drawing Plan of Administration building

3.1 Project Details

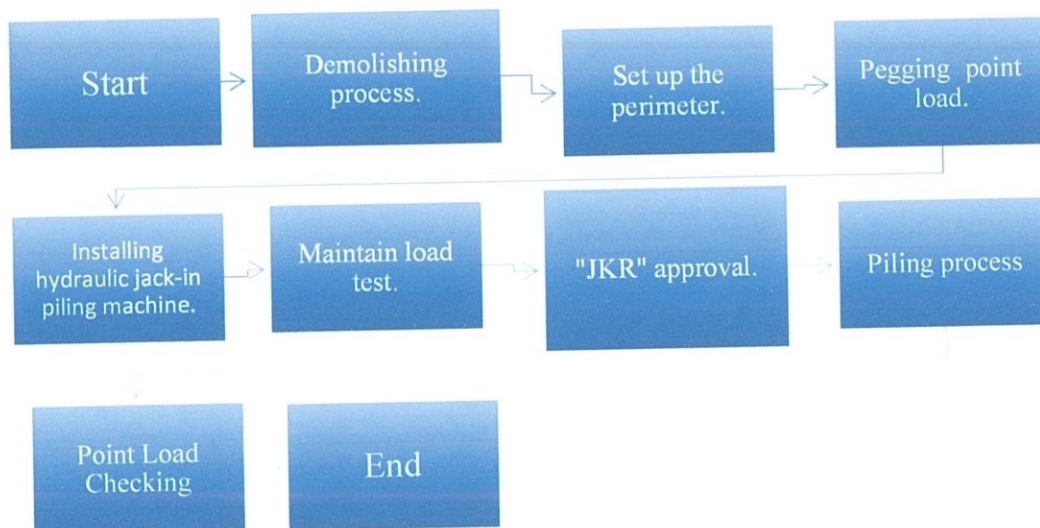
PROJECT NAME	'PEMBINAAN PEMBANGUNAN GANTIAN 8 BLIK DARJAH DAN LAIN-LAIN KEMUDAHAN DI SMK SERI SENDAYAN, NEGERI SEMBILAN'
CONTRACT NO.	JKR/NS/P/S/044/2017
CONTRACT SUM.	RM 6, 719,403.60 *GST INCLUDED
CONTRACT PERIOD	102 WEEKS
CLIENT	MINISTRY OF EDUCATION MALAYSA
CONTRACTOR	AD MUTIARA SDN BHD
CONSULTANT	ASJ TEGUH SDN BHD (Sub-Contractor)
DATE STARTED	28//11/17
DATE END	11/11/19
EXTENSION OF TIME	124 DAYS

Table 3.1 Project Details

3.2 Method Process of Installing Piling Construction

The process started with demolishing process which there are some trees need to be excavation. Then, site surveying work by the Land Surveyor to calculate the measurement of area based on the drawing. After that the workers will mark the site area with the offset pegging. All the point load will be pegging as a mark by the land surveyor. Next the Hydraulic Jack-In machineries will be installs. Before the piling process started the maintain load test need to be done to set the power force needed to install the piling. After the approval from JKR is gained the piling process can be proceeds. Finally, after all the piling process been made, point load checking will be carry out.

Figure 3.2 Flow chart of Hydraulic Jack-In Piling Method Process



MANPOWER:

Table 3.2 Listed of Manpower

NO.	Labour	Roles	No of person in charges.
1.	Land Surveyor	Determining the three-dimensional positions of points with the distances and the angles of precast pile.	1 Person
2.	Site Engineer	To ensure the process of this piling run smoothly and to avoid any problems occur.	1 Person
3.	Site Supervisor	Supervise the piling works most of the time to be running on time and to make sure all the workers do their works.	1 Person
4.	Piling Machine Operator	Operate the Hydraulic Jack-In Piling Machine.	1 Person
5.	Skilled Workers	To ensure the position of the precast pile is on to the marked point load.	1 Person

3.2.1 Methods of Hydraulic Jack-In precast piling process system consists of:

1. Surveying Works
2. Clearing Works
3. Installing Machine
4. Piling Works
5. Quality Checking

Surveying Works

This is our site area for a four-storey building. There will be a teacher room and School office which also included a Physic Laboratory and extra classes on this administration building.



Photo 3.3 Site area for a four-storey building

Our site supervisor is showing the piling structural drawing of our project site area to the outsourced Piling client for easier to our client for making the exact measurement.



Photo 3.4 Site supervisor is showing the piling structural drawing

The Land Survey come to calculate and set up the perimeter of the area for this project. By referring drawing of the site layout and the theodolite is used through this surveying works.



Photo 3.5 Land Survey come to calculate and set up the perimeter of the area.

After the measurement has been made, the workers will put the offset pack around the site area.



Photo 3.6 Offset peg being pegging in to marks the site area.

After the final calculation has been made and the agreement is achieved, the site area will be quarantined and announced as a construction area.



Photo 3.7 Site Area view

Clearing Works

Before cutting off all this tree, it would need the government permission before took down this tree. When permission is gained the tree will be paint with red colour.



Photo 3.8 Demolition process of cutting off all this tree.

Demolishing process by cut off all the trees that are less than 3metre from the building to be built. This is the law from building regulation.



Photo 3.9 This tree been mark before excavation process.

Using the backhoe and the excavator to pull out this tree. Some of the tree is “Pokok Gaharu” which is valuable and can cost a lot of money. That why government has extra care to the trees.



Photo 3.10 Excavation process

After the tree has been cut off. All the workers will cut them into pieces using the chainsaw. This for easier for the workers to dispose them.



Photo 3.11 Tree cut into pieces using the chainsaw

All the trees will be collected and gather all of it into box garbage, before a lorry would carry it to the disposal area.



Photo 3.12 Tree is been put into a container.

Installing Machine

This lorry is from Lukut, Negeri Sembilan is carrying the Jack-In pile machine came to the site. The installation for this machine may take sometimes because of the mega structure machines.



Photo 3.13 Brought in the piling machine.

The lorry also carrying a load which been used to hold the Hydraulic Piling Machine.



Photo 3.14 The lorry carry all the hydraulic machine part.

This crane is used to install the piling machine by lifting it off from the lorry and all the weight load for holding on the machine to make it stay put. Its, also used for arranging the platform for the machine to move for un level surface.



Photo 3.15 The Crane is used to lift up a platform for lorry going through.

This piling machine is already installed on the exact location of load point to make it easier for the maintain load test to be made.



Photo 3.16 Cubical Load as weight for the hydraulic piling machine.

Piling Works

Maintain Load Test is made before the piling works started. The test is for measure the depth of the ground needed to drive in the pile based on the strength of soil. This test will be made by referring the Static load test chart. There will be one worker needed to supervise the load test machine for 48 hours for every 3 points loads.



Photo 3.17 Hydraulic Jack-In Pile Machine

Example of Static Load Test Chart that been used to measure the strength and the movement of soil. Based on this chart maintain load test can be done and an accurate pressure of load for this type of soil can be adjust. So, the process of piling would be easier.

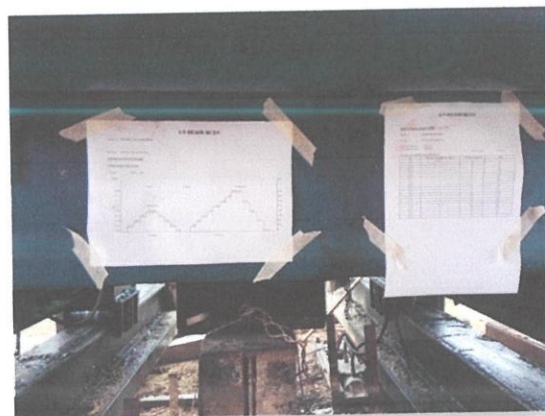


Photo 3.18 Maintain Load Test Chart been used as referral for the test.

The crane is used to rearrange all the piling bars at the middle of the site. This for an efficient smooth work process for the hydraulic jack-in pile machine to installing bars and easier for the big machine to move.



Photo 3.19 Crane is used to rearrange all the piling bars.

After the approval of the results of maintain load test. The piling works can be proceeds. The machine operator will take the iron chain from the machine and hook to the piling concrete bars. Then using this machine it would pull up the bar to its position and pass it to another skilled workers under the machine.



Photo 3.20 Piling process.

One skilled worker will be in-charge for set up the position of piling bars being put at the accurate spot of point load. After the operator will run the machine and drive in the pile with a specific amount of load base on the load test chart results.



Photo 3.21 Positioning of piling bars.

After the pile have been drive in a welding process is needed to connect between the precast pile by the workers for this project. The piling process is continued to all point load based on the referral piling drawing.



Photo 3.22 Welding process

Quality Checking

A few days after the piling works have been done, the following process continued. There need to make a quality checking to make sure all the pile follows through the specification and measurement of the drawing plan.



Photo 3.23 Quality checking

This is our Land surveyor Hj. Murad, his job is to ensure all the point load with the pile is right on its place using this equipment called theodolite. By using this equipment and refer to the drawing plan he needs to calculate the distance and the angle.



Photo 3.24 Our Land surveyor Hj. Murad

Using theodolite they need to see to the prismatic level. His assistant will put the prismatic level to the centre of the point load. After that the measurement will appear on the digital screen.



Photo 3.25 Putting the prismatic level to the centre of the point load

All measurement will be recorded. After that this measurement will be updated into the drawing plan by Hj. Murad to create the new measurement of the piling drawing.



Photo 3.26 Measurement will be recorded to an As-Build drawing.

3.3 Type of soil required for Hydraulic Jack-in pile injection system.



Photo 3.27 Site Condition View

This site area type of soil is a sandy material. This is one of the reasons that this project used a modern method of installation for pile which is the hydraulic injection system. As the characteristic of soil is encouraging them to use it. The characteristic of this soil is erratic, consists of very soft clayey to very loose sandy materials.

Table 3.3 Machineries of Hydraulic Jack-In Piling process





<i>Machineries</i>	<i>Description</i>
<p>➤ Hydraulic Jack-In Pile Machine</p> 	<p>➤ The piling machine is to jack-in the pile into ground using injection system.</p>
<p>➤ Crane</p> 	<p>➤ To lift up the precast pile and arrange it. It is also for the uses to lift all heavy load on the site.</p>

Table 3.4 Tools of Hydraulic Jack-In Piling process

<i>Tools</i>	<i>Description</i>
<p>✓ Theodolite</p> 	<p>✓ To calculate the bearing and the angle distance for each point load. It is for the quality checking. Based on the referral drawing plan.</p>
<p>✓ Welder</p> 	<p>✓ Welding is a sculptural process that joins the precast concrete, by using high heat to melt the tin and allowing them to cool causing fusion.</p>

CHAPTER 4.0

CONCLUSION

In the end of this piling foundation process, this Hydraulic Jack-In piling method give a lot of pros and cons throughout this whole process of drive-in pile for the new site project. This modern method had been improvised and give a big change into the process. This method is very convenient useful and environmental friendly as it produces less unwanted sound. It also provided more smooth process in installing piling than the conventional method. This Hydraulic Injection Pile need some soil specification on the characteristic to use this method. This site had a sandy material of soil which the chances for the soil movement is high. That's why the site engineer proposed to use this method of installation to the client. In this report also shown all the machineries and tools that been used through this whole process. As for the disadvantage of this drive-in method it need to be supervised and really need a high observation to avoid any inaccurate position of pile that being install into the ground. Yes, along this process it is same as what had been learned as a theory. This method has already been world widely used in other country. In order, to use this type of method its require a highly cost of money but 'with a good investment comes with a good quality'. There is some consequence that need to be faced off along this process but all of it are under control as the workers involved are very high experience.

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Surf Web:

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