



**DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)**

**CONSTRUCTION METHOD OF PRE-BORING WORKS AND SPUN PILE
INSTALLATION AT PTD 182919, BUKIT INDAH, JOHOR BAHRU**

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DECEMBER 2019

It is recommended that the report of this practical training provided

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Entitled

**Construction Method of Pre-Boring Works and Installation of Spun Pile at PTD 182919, Bukit
Indah, Johor Bahru**

Accepted in partial fulfillment 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 herein, prepared during a practical training session that I underwent at Chuan Luck Piling Sdn. Bhd. for duration of 20 weeks starting from 5 of August 2019 and ended on 13 of December 2019. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

.....

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Date : 13 December 2019

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

Thank you so much.

ABSTRACT

Piling is mainly known in a deep foundation category that is designed specially to transfer all type of load inside superstructure to the deepest bed of soil. Spun pile and reinforcement concrete piles are one of the common piles used and designed with numbers of methods by using many formulas. With these installations of deep foundation, there are also few methods of construction conducted. The main objective of this case study is to identify the method construction for pre-boring and installation of spun pile, investigate the relationship of pile driver analyzer with piles installed, and to identify the hazards occur during the construction. The installation and method used for this deep foundation installation is also conducted and approved with tolerance and its designed working load capacity.

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CHAPTER 1.0

INTRODUCTION

1.1 Background and Scope of Study

Pile foundation or mainly known as deep foundation, requires supporting all high rise building in Malaysia. It is the shallow and the lowest part of a structure which is to establish below the ground level. Therefore, pile foundation is purposed to transmit the load from the superstructure to the weak strata, and the subsoil. There are several types of pile consisting of end bearing piles, friction pile, compaction piles, and others. There were also pile classification based on the material and the composition such as concrete pile, which consisting of pre-cast and cast in situ pile. In Malaysia, spun pile is rapidly use by all construction industry which required to construct a high-rise building.



Figure 1.1: Spun Pile

Prestressed concrete piles or spun pile are extensively employed throughout the world in marine structures and foundations. The advantages they offer are their strength in bearing and bending, their durability and their economy. Therefore, there are several dimensions of spun pile that are widely use around the world starting with 300mm diameter to 1200mm diameter. The high strength prestressed spun concrete piles, commonly driven with hydraulic impact hammers or preferably installed with jacked-in rigs when considering the stricter regulations with respect to noise and vibrations in more urban areas, often offer a competitive choice of foundation system for projects with medium and high loadings.

In order to install a spun pile, the perfect and convenience method is needed to apply. In this project, pre-boring method is used to install a spun pile because it can reduce several environmental problems and quality control problems. The pre-bore machine will dig up to several depth using an auger to bring the soil out, followed by installation of the spun pile. There are many methods of installing a pile, however the aim of this is to investigate the method installation of spun pile in Malaysia area.

1.2 Objectives

There are several objectives to obtain from this report regarding installation of a concrete pile such as;

1. To determine the method statement for installing spun pile.
2. To determine the pile test using pile driver analysis (PDA) method.
3. To identify hazards and propose a risk control for piling works.

1.3 Background and Scope of Study

This study is designed to understand the installation process of a concrete spun pile at PTD 182919, Bukit Indah, Iskandar Puteri, Mukim Pulau, Daerah Johor Bahru, Johor Darul Takzim. This purposed site is located near to all facilities and surrounded by city area. In this report, will included the method statement of installation of spun pile 600mm diameter along with the machineries involved, material used, and also the number of manpower. Also, this report will come out with other attachment such as the drawing plan, table, diagram and figure, flow of the process and a complete method statement with procedures.

1.4 Method of study

i) Observation

Observation made is based on what is going on every day on purpose site, during the practical duration. Activity such as installation of a spun pile and pre-boring is done, and it is inspected together with the site supervisor. Toolbox meeting, that were held on every Tuesday is also observed and recorded as it was very important. Toolbox meeting function is to remind all the worker on the purpose site to stay safe and prevent any hazards. All of the observation and inspection is taken in form of picture and videos for further use and for report making information.

ii) Interview

Interview job has been made with site manager, site supervisor regarding the spun pile installation and also pre-boring work. They instructed and give information together with another team on the site. Surveyor team also provide knowledge on how to determine point for the boring and installing process. The surveyor team use equipment such as auto level and total station to shoot the point and plot in the drawing plan. All of these information gains are stored inside a daily logbook.

iii) Document Review

All the important documents are collected from the proposed site and also from the office. Documents such as penetration drawing plan, pile cap plan and surveyor plan are copied and transferred into hardcopy with permission from the project director. Also, the other documents that were collected are technical document of the purpose site, method statement of Pile Drive Analysis attached with all the completed data and final recording from its test.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Chuan Luck Piling Sdn. Bhd is located at PTD 102015, Jalan Seelong, 81400, Mukim Senai, Kulai, Johor. This empire had established since 1995 and spread their wings to Southern Region of Peninsular Malaysia until now. Chuan Luck Piling Sdn. Bhd. has tons of completed project from the past 20 years of experience on piling and construction technology. From the beginning, Chuan Luck Piling Sdn. Bhd. are playing their role only in piling technology. Ever since it leaps through time, Chuan Luck Piling Sdn. Bhd has enlarged the company legacy with the establishment of C L Pile Sdn. Bhd which is designed to construct their own concrete pile. Until now, this company has already involved in every construction technology such as maintaining load test, civil engineering work, surveying work and also pre-boring works. C L Pile Sdn. Bhd is located at 801, Jalan Sri Perkasa 1/3, Taman Tampoi Utama, 81200 Johor Bahru, Johor Darul Takzim.

This company also involves in variety type of projects such as the construction of schools, shopping mall, apartment and also bridges. Chuan Luck Piling Sdn. Bhd. had also making their priority in ensuring their service at the very best state. They were also ensuring that all the manpower achieve at least three (3) minimum ISO related training or seminar per year to make sure the safety at the worksite. Chuan Luck Piling Sdn. Bhd. right now have more than 100 employers and ongoing projects because of their good services in piling and pre-boring construction. The next page shown are the location of Chuan Luck Piling Sdn. Bhd and the company logo.

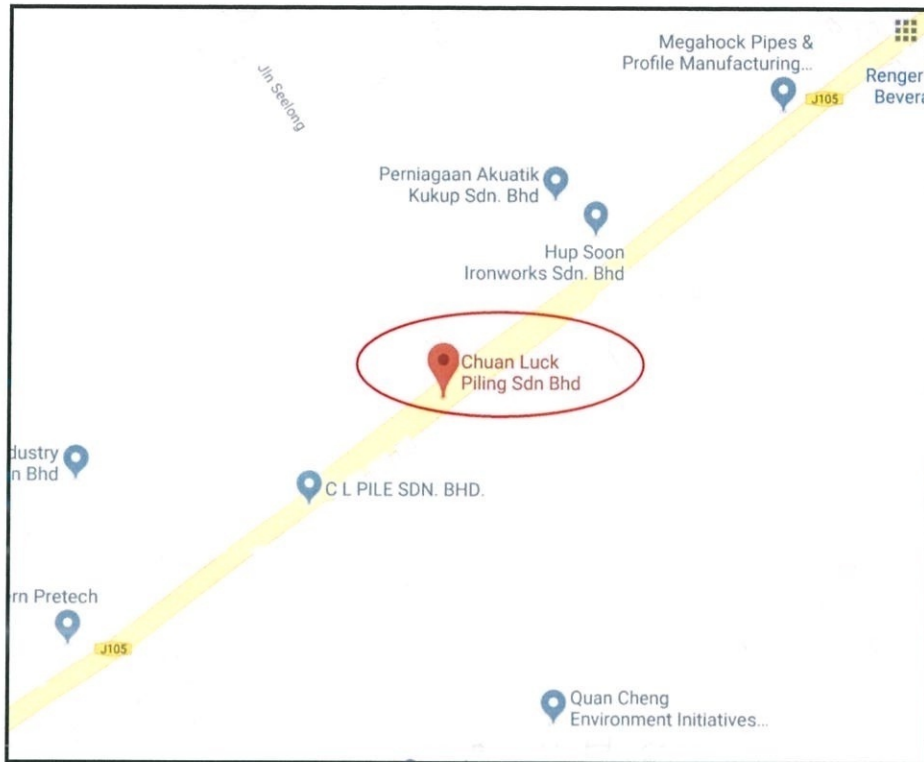


Figure 2.1 Chuan Piling Sdn. Bhd. Location

Source: Google Maps



Figure 2.2: Chuan Luck Piling Sdn. Bhd. Company Logo

Source: Chuan Luck Piling Sdn. Bhd.

2.2 Chuan Luck Sdn. Bhd. Company Profile

1.	Company name	Chuan Luck Piling Sdn. Bhd.
2.	Company address	PTD 102015, Jalan Seelong, 81400, Mukim Senai, Kulai, Johor.
3.	Year of establishment	1980
4.	Contact	
5.	CIDB registration number	0120021101-JH076798
6.	Scope of work	- Piling Construction - Pre boring Works - Civil Engineering Works - RC pile manufacturing
7.	Company vision	We committed to provide one stop service for piling works, competitively priced & extensive service portfolio and Customised for a better service
8.	Company mission	1. To ensure the evaluation of sub-contractor and supplier to our services at an average rate of not less than 90%. 2. Achieving minimum 85% client satisfaction in all Activities 3. Ensure “Zero” Client complaint / Government compound on Occupational Health & Safety issue per year

Table 2.2: Company Profile of Chuan Luck Sdn. Bhd.

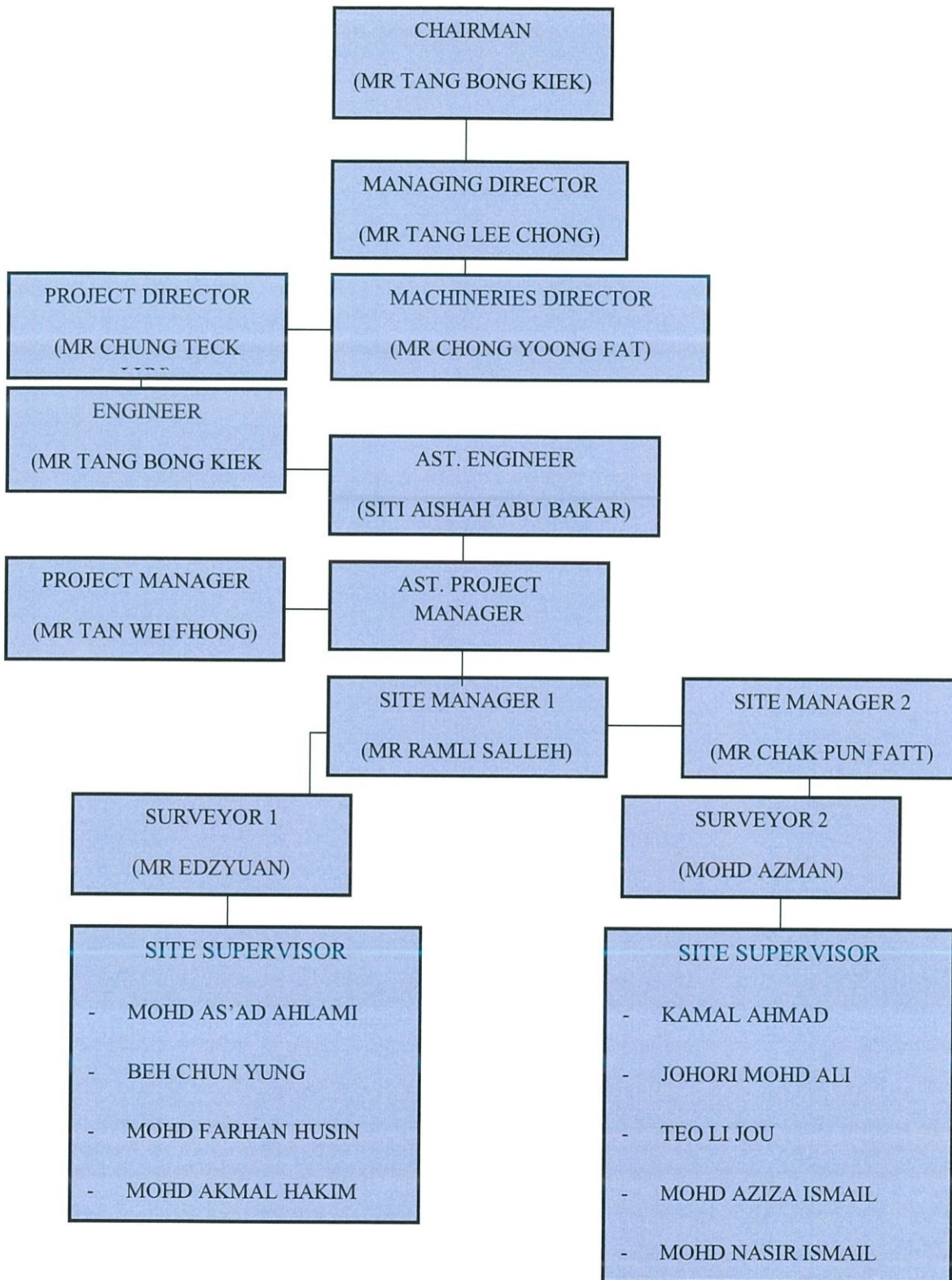
Source: Chuan Luck Piling Sdn. Bhd.

2.3 Organization Charts

Chuan Luck Piling Sdn. Bhd. is directed by Mr Chung Teck Lun, followed by Site Manager En. Ramli B. Salleh, and Project Manager Mr Tan Wei Fong. This company is greatly managed and well care by their leadership skills and experience in running site projects. Followed by Project Administration, Pn. Azura Abdul Razak, Safety & Committee by En. Normal Eastkandar Ahmad Eastemal, and Engineering team by Ir So Wee Siang.

The construction projects also supervise by 3 supervisors, Mr Beh Chun Yung, Mohd As ad Ahlami and Akmal Hakim and the pre-boring and piling team while the surveyor team is conducted by Mr Edzyuan and the assistant surveyor.

Site Organization Chart of Chuan Luck Piling Sdn. Bhd.



2.4 List of Projects

2.4.1 Completed Projects

Year	Major Projects	Value of Projects Done
2006	Piling Works for Proposed Development of: - 1) 28 Units 3-Storey Shop Office from Block 21-22 At PTD 67732-PTD 67745 & PTD 67774-PTD 67787 2) 28 Units 3-Storey Shop Office from Block 23-24 at PTD 67878-PTD67891 & PTD 67927-PTD 67914 Taman Sutera Utama-Phase 21 (Pakage 3), Mukim Pulai, Daerah Johor Bahru, Johor, Malaysia for Messrs Tanah Sutera Development Sdn Bhd.	RM 1,000,000.00
2007	Proposed Construction and Completion of 40 units 2-Storey Terrace Type A at Zone 3A2 & 36 Units 2-Storey Terrace Type B at Zone 3A3 and Optional of 38 Units 2-Storey Terrace Type A at Zone 3A2 and 40 Units 2-Storey Terrace Type B at Zone 3A3 at Taman Impian Emas, Mukim Tebrau, Daerah Johor Bahru.	RM 1,500,000.00
2008	Proposed Piling Works for 128 units SST'A' on PTD 55141 - 55154, 55165 - 55187, 55198 - 55221, 55232 - 55275, 55279 - 55290, 55291 - 55301 & 151 units SST'B' on PTD 54990 - 55140 and 1-unit Double Chamber Sub-Station, Phase 3C, Bandar Baru Kangkar Pulai for M/S Keck Seng (M) Berhad	RM 1,500,000.00
2011	Proposed Piling Works for I) 45 unit's SST on PTD 123960 – 124004 @ Sector 9; ii) 76 unit's SST on PTD 123884 – 123959 @ Sector 11; iii) 14 units SSSD on PTD 123110 – 123123 @ Sector 13, Taman Daya, Johor Bahru for M/S Keck Seng (M) Berhad	RM 650,000.00
2014	Cadangan Membina 107 unit Rumah Teres Dua Tingkat Fasa 5A (Fasa 5A1 – 54 unit Jenis A, Fasa 5A2 – 51 unit Jenis A dan Fasa 5A3 – 2 unit Rumah Contoh Jenis B) dan satu unit Pencawang Elektrik 'Double Chamber' di atas Sebahagian Lot PTD 117034, Taman Seri Austin, Mukim Tebrau, Johor Bahru, Johor Darul Takzim untuk Tetuan Dynasty View Sdn Bhd	RM 1,200,000.00
2014	THE EXECUTION AND COMPLETION OF PILING WORKS AND RELATED ANCILLARY WORKS FOR 68 UNITS CLUSTER HOUSE, 30 UNITS TOWN HOUSE, AND 1 UNIT GUARDHOUSE AT LOT 141603, JALAN PERKASA 7, TAMAN UNGKU TUN AMINAH, MUKIM PULAI, DAERAH JOHOR BAHRU.	RM 1,600,000.00

Table 2.4.: List of some completed project of Chuan Luck Sdn. Bhd.

Source: Chuan Luck Sdn. Bhd.

CHAPTER 3.0

THE CASE STUDY

3.1 Introduction on Purposed Project

The purposed project is constructed at PTD 182919 Bukit Indah, Iskandar Puteri, Johor Bahru. The site is mainly used on 300mm x 300mm reinforced square pile, 400mm x 400mm reinforced square pile and also the 600mm diameter spun pile. The estimated cost of the whole proposed project is RM 5870473.00, and the duration of the driven pile should have finished within the 6 months (starts from 1st of August 2019 until 30th of January 2020).

The main developer of this project is led by SP Setia Construction, Chuan Luck Piling Sdn Bhd as the main contractor and the last one is SKL Piling Sdn Bhd as the sub-contractor.

This project actually consists especially on high rise apartment with two blocks, parking lots with basement floor, and facilities. That is why, large piling size is tendered along with huge design working pile. The project that I have been chosen and placed was piling works for *Cadangan Pembangunan Berstrata Komersial Bercampur Skytree yang mengandungi: -*

- I. *1 Blok Pangsapuri Perkhidmatan – Blok A 19 Tingkat (228 Unit)*
- II. *1 Blok Pangsapuri Perkhidmatan – Blok B 20 Tingkat (240 Unit)*
- III. *5 Tingkat Podium yang melibatkan:*
 - a) *2 Tingkat Tempat Letak Kereta Berserta 26 Unit Ruang Perniagaan*
 - b) *2 Tingkat Tempat Letak Kereta Berserta Kemudahan Asas*
 - c) *1 Tingkat Tempat Letak Kereta Berserta 12 Unit Pangsapuri Perkhidmatan dan Kemudahan*

Di atas sebahagian PTD 182919, Bukit Indah, Iskandar Puteri, Mukim Pulai, Daerah Johor Bahru, Johor Daruk Takzim untuk tetuan Bukit Indah (JOHOR) SDN. BHD.

The overall cost for this proposed piling project is five million eight hundred seventy thousand four hundred- and seventy-three-Ringgit Malaysia (RM 5,870,473.00). The cost is only made by JUBM Sdn. Bhd. as the Quantity Surveyor throughout this initial project. The expected duration for this project estimated is 6 months starting from 1st of August 2019 until 31st of January 2020. Chuan Luck Piling Sdn. Bhd. is the Main Contractor for this commercial project followed by several participants involves below:

No.	Company	Name
1	SP Setia (Johor) Sdn. Bhd.	En. Ahmad Hairul
2	Jurutera JKR Sdn. Bhd.	Mr. Tam Kim Kun
3	SP Setia (Johor) Sdn. Bhd.	En, Mohd Hafiz Mazlam
4	JUBM Sdn. Bhd.	Ms. Tan Pei Ling
5	Chuan Luck Piling Sdn. Bhd.	Mr. Chung Teck Lun

Source: Chuan Luck Sdn. Bhd.

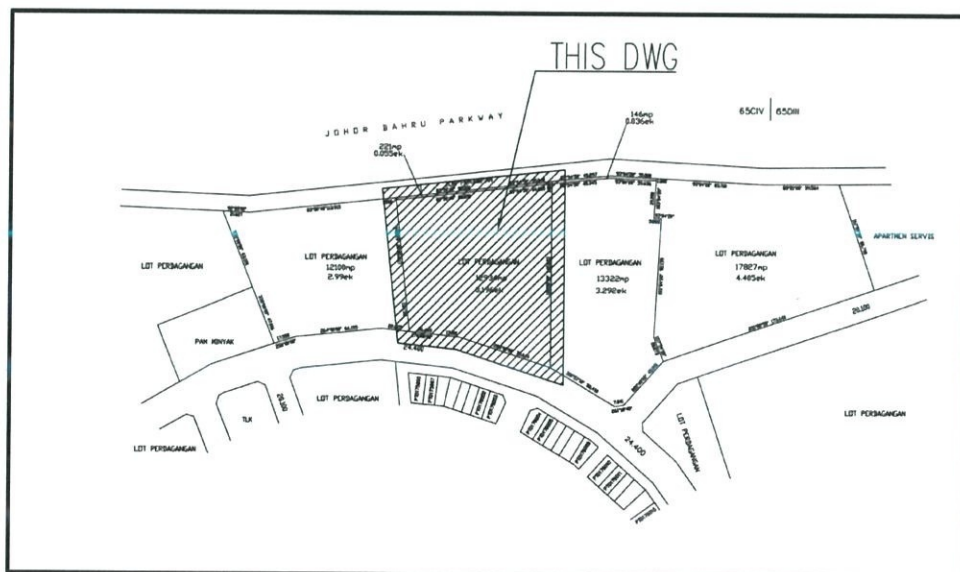


Figure 3.1: Site key plan

Source: Chuan Luck Sdn. Bhd.

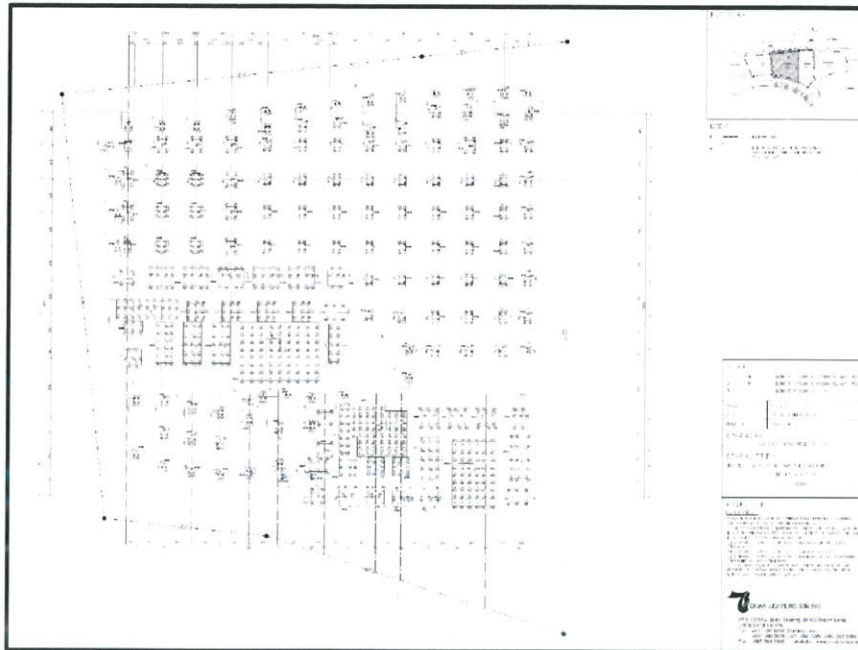


Figure 3.2: Proposed piling plan

Source: Chuan Luck Sdn. Bhd.

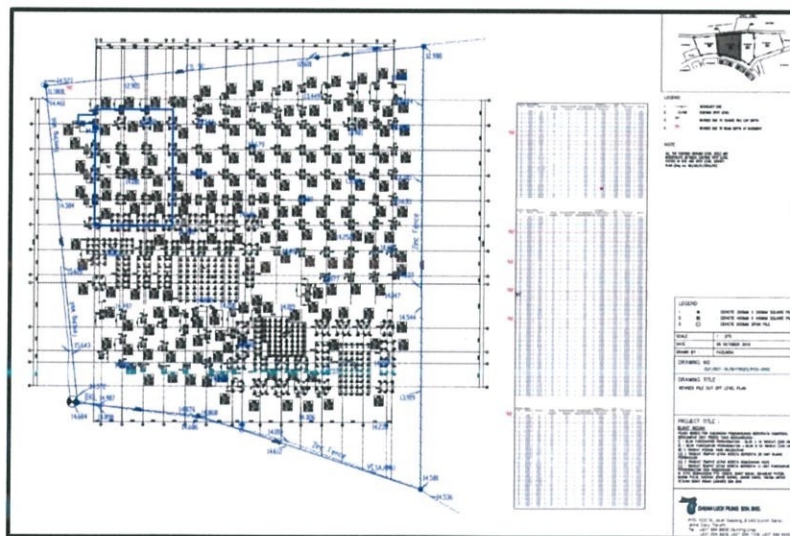
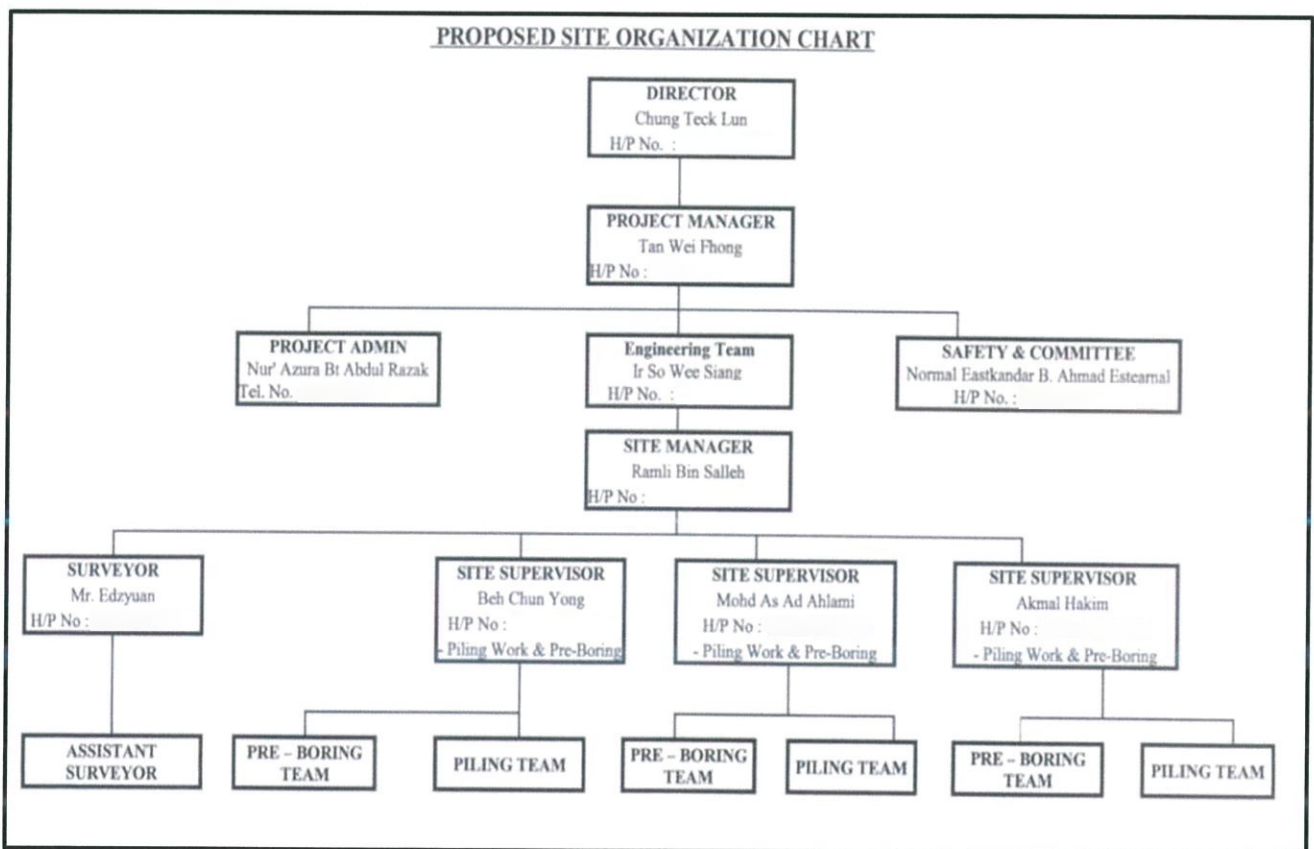


Figure 3.3: Pile cut-off level plan

Source: Chuan Luck Sdn. Bhd.

The designed piling points contains of 981 piling point that has to be driven into the ground along with the detailed levelled ground. There are 552 numbers for 600mm diameter spun pile, 314 numbers for 400mm x 400mm reinforced concrete square pile and 115 numbers for 300mm x 300mm reinforced concrete square pile. The construction of this apartment includes a car park, a basement, and public facilities such as swimming pool, children playground and many more. In Chuan Luck Piling Sdn. Bhd, there are few known people who are in charge for this big project. The people involved are the project director Mr Chung Teck Lun, Mr Tan Wei Fhong as the project manager, Mr Ramli Salleh as the site manager, Project Administration Pn Azura Razak, Engineering Team by Ir Soo Wee Siang, Surveyor team by Mr Edzyuan, Site Safety Supervisor by Mr Normal Eastkandar. Followed by site supervisors who are Beh Chun Yong, Mohd As' Ad Ahlami, and Akmal Hakim. This project also includes the piling team from Chuan Luck Piling Sdn. Bhd and the pre-boring team by SKL Piling and Construction Sdn. Bhd. as the sub-contractor.



Source: Chuan Luck Sdn. Bhd.

3.2 Case Study on Pre-boring Works and Piling Installation

Case study on this report will mainly focused on Pre-boring Works and Piling Installation on spun pile. Pre-boring work is the primary method before driven the pile. After the soil investigation work is done, results on the soil sample will be determined whether it is hard or soft type. Eventually, the project finally has to use this method which is pre-bore. In the meantime, the inspection of this work is upon completion on the soil boring reaching the toe, the borehole then to be verified by the C.O.W. The designated depth shall be recorded on both pre-bore and also piling record. Machineries involved on both works are hydraulic piling rig and any continuous improvement, manufacturer reserves its right to change without notice.

3.2.1 Setting out Pile point

Before the work starts, the exact coordinate of the piling points needs to be surveyed precisely with total station and prism equipment. The point of every piling number will be known after setting up with total station and drawing plan. Every details of its north and east value will be inserted. After the exact point is taken within the reflection of the prism, a peg is inserted inside the soil as the survey works ended. A survey peg or survey stakes are used to mark out and indicates point of a site. It is usually made out of metal or wood sticks and came with colored tops caution tape.

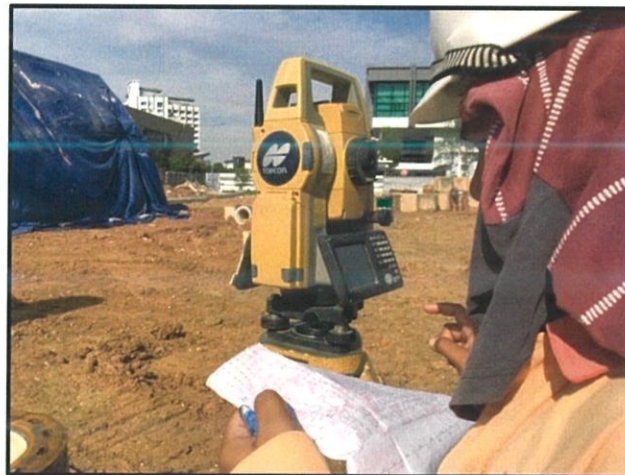


Figure 3.4: Inserting coordinate of each piling points



Figure 3.5: Reflecting the exact point with prism



Figure 3.6: Peg the surveyed point and mark the point number

3.2.2 Checking Eccentricity

The first step for pre-boring machine during its works started with taking the offset within a recommend distance (in meters). Usually, the measurement applied is about 100mm to 120mm and performed by assistant pre-bore operators. This is important to avoid the auger from slightly exceeded the eccentricity value which is 75mm. By using plum bob, the verticality of the auger and the caliber's axis must be in a parallel line. After its initial bored hole, which is

about 500mm, the original coordinate needs to be checked again in order to maintain its recorded survey point.



Figure 3.7: Setting up off set



Figure 3.8: Checking the eccentricity with surveying equipment

3.2.3 Pre-Boring Works Starts

Pre-boring works start as likely before if its original coordinate does not exceed more than 75mm and the soil will be deducted from the hole. In addition, the offset can also be taken off. The method will be continued until it reaches its required pre-bore depth (hard strata). In the final method statement of pre-boring works, weight tape will be measured from the top level of the soil until it reaches the end of the hole. If the depth is achieved, the point is ready for the spun pile to be driven next

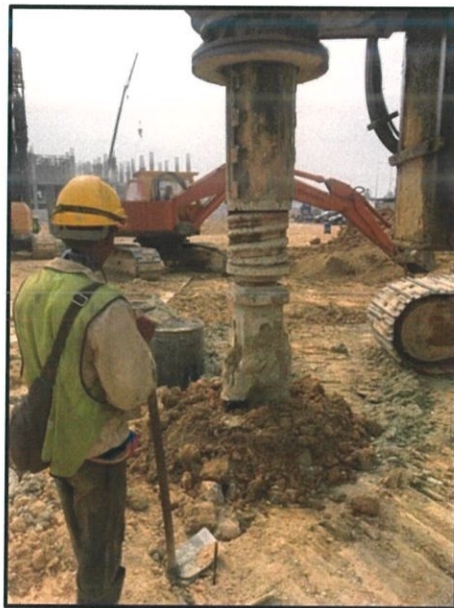


Figure 3.9: Proceeding the pre-boring works

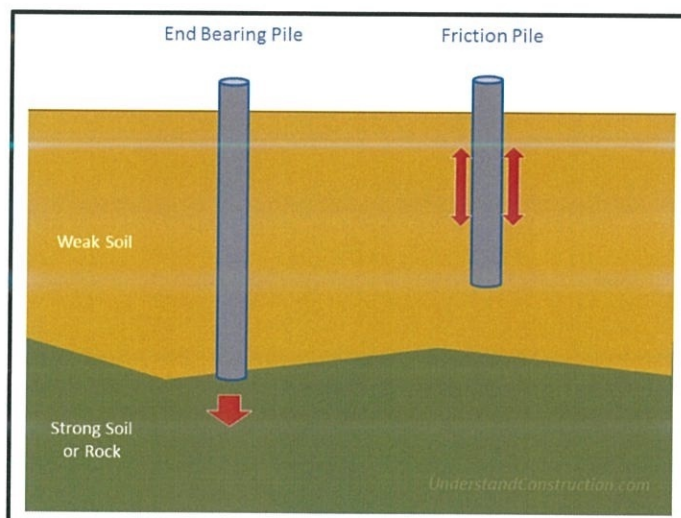


Figure 3.10: The designed concept of reaching the acquired pre-boring depth

Source: Google photos



Figure 3.11: Checking the achieved pre-bore depth

Soon after the pre-boring work is done, the data of every aspect from the process will be recorded inside and printed as shown.

Figure 3.12: Pre-bore Record

3.2.4 Driven the Spun Pile

All the spun piles will be escorted and placed onto flat surfaces to avoid from cracking and damaging the soil level. Mobile crane or crawler crane is operated to lifting up the piles from the trailer. During this procedure, it is very important to stay alert regarding safety precautions. The hooks of the crane need to be in a safe condition and thick glove must be wear as the lifting works going.



Figure 3.13: Transporting the spun pile onto a flat surface

All the piles should be marked on the interval of 500mm to enable easy determination of its pile penetration before installing. With the uses of stainless coating and thick brush, the numbers of interval will stay clear to be seen. Upon marking the intervals, measuring tool is used and workers can identify the actual pile length according with the information stated on every side of the pile (6 to 12 meters). Finally, the spun pile will be driven by hydraulic hammer piling rig mounted along with the leader of the machine.



Figure 3.14: Marking the intervals in meters

Before carrying out the commencement of driving, each pile and the leaders or the guides for every pile frame must be checked with plumb. The pile shall be carefully pitched in to the pre-bore hole by controlling its verticality and the plumb's verticality needs to be maintained during the pile installation. During the operation, the center of the hammer ram to the center of the pile is maintained within tolerance limit.



Figure 3.15: Pile assistant is checking the verticality



Figure 3.16: Verticality checking with plumb bob



Figure 3.17: Mounted up the pile with the leader of pile machine

The head of every pile needs to be protected with layers of plywood and dolly. Changing the new layer of plywood is necessary to make sure the pile head is not broken and damaged. In order to avoid from damaging the pile head, 24.0mm or 24.5mm thickness of plywood is used for each types of pile on this site. Each 500mm interval of dolly is marked with welded part, while material made for this item is basically metal which can upfront any types of energy transferred.



Figure 3.18: 24.0mm and 24.5mm thick plywood



Figure 3.19: 2.5m to 3.0m dolly is used to get the final set

For every new pile length, the new joint must be butt-welded in full circuit length as mentioned in the figure below. The welding process should be taken for about an hour and cooled down to stable temperature before continuing the work. After several time taken, an approved welded circuit will be coated to prevent from rusting. The strength of the joint plays a major factor from collapse.

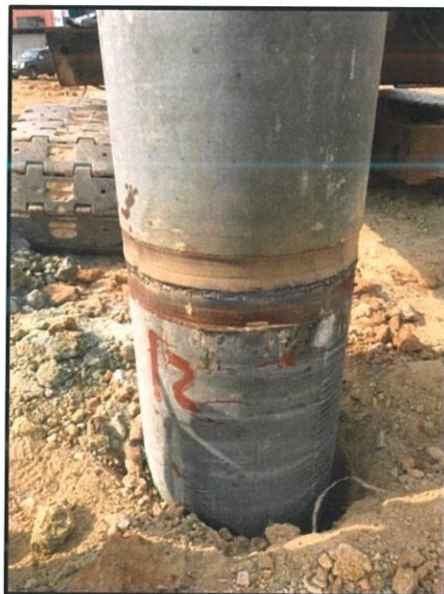


Figure 3.20: The joint is welded, and excessive parts are removed



Figure 3.21: Coating is applied to cover the welded parts from rust

3.2.5 Taking Temporary Compression

The recording and driving the piles should not be interrupted until it reaches the specified final set (consultant's approval). During the final set, the exposed part of the piles must be in a good condition. The dolly is also shall be in good condition if used and the hammer drop must be in one line, along with the pile axis. Without causing any damage to the referred pile, the hydraulic hammer needs to be stable and perform render specified energy. The impact surface shall be in flat and right angle to the pile and hammer axis.



Figure 3.22: Taking the final set

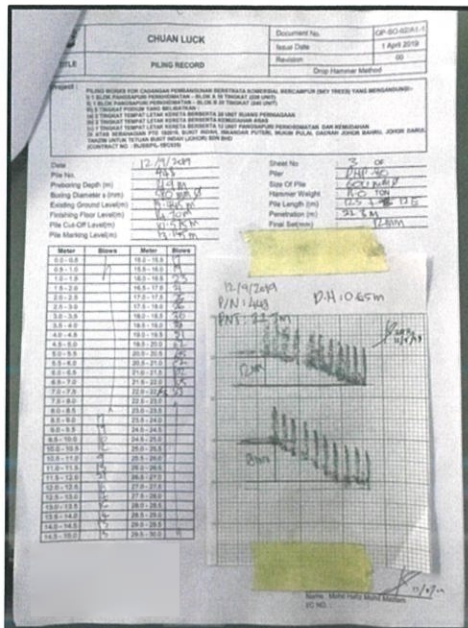


Figure 3.23: Approved final set with hammer blows

3.2.6 Piling Recording

All the installed pile should be recorded inside the piling records which indicate the combination of pile driven, penetration depth, and the achieved final set during the last ten blows.

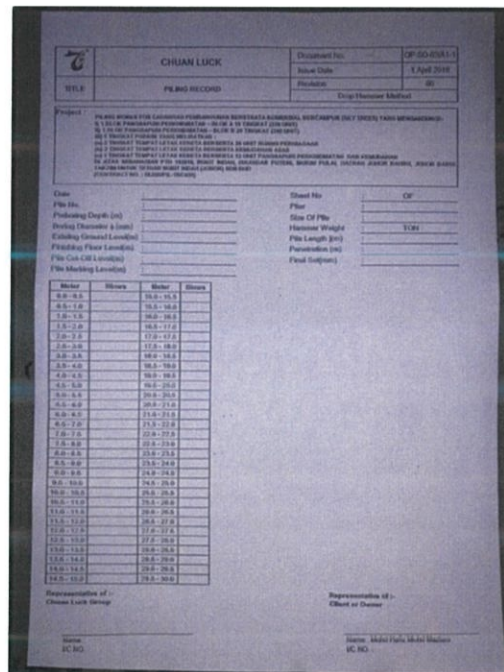


Figure 3.24: Proposed recording form

Upon the completion of the work, a surveying work of eccentricity check of the pile is conducted and to be submit required sets of pile as-built plan for Consultant's approval. Furthermore, the bored and installed pile shall be covered with reinforced concrete plate for safety purpose.



Figure 3.25: Closing the installed pile

3.3 Pile Driver Analysis Test on Working Pile

Dynamic Load Test or mainly called as Pile Driver Analysis Test (PDA) is intended to provide fields of estimation towards capacity of a working pile. In addition, pile driver analysis also states the information about the integrity of a pile shaft under its high strain. Each pile that have been driven will be tested by Consultant's advice to determine remaining strength and pile's efficiency right after the final set. This method of test can be used for almost type of pile such as cast-in piles, micro piles, prefabricated piles, steel piles, timber piles and more.

Pile Driver Analysis Test (PDA) also provides a complete installation record, including compression and tension stress, transferred energy, and all contribution of shaft friction with toe resistance to the pile's bearing load capacity.

3.3.1 Test Procedure

Test Pile

The proposed pile will be selected after installed to carry out the test by Engineer. The number and the location of tested pile will be recorded to be showed so that the engineer can analyze the result efficiently.

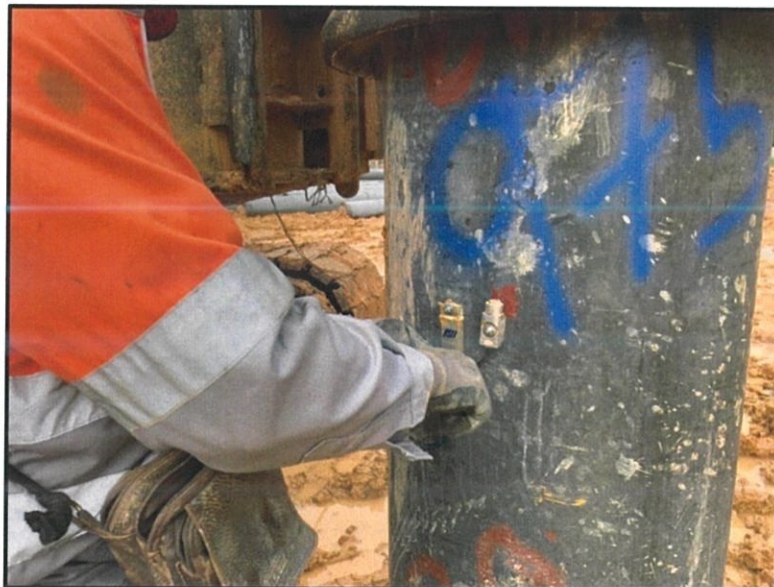


Figure 3.26: Choosing to point for conducting test

Gauge Installation

Pile driver analysis involves attaching two strain transducers and two accelerometers to the pile at least one folder of the pile size below the pile head during the initial driving. In the most instances dynamically, tested piles should be specified to be one meter longer than the penetration depth of the piles so that the gauges are not driven into the ground. The transducers must be mounted directly on the opposite side of the pile.



Figure 3.27: Installing gauge to computer

Hammer Used

The hammer used to provide the impact for the PDA test depends on the size, depth and designed load capacity of driven spun pile. During the blow, PDA computer will directly monitor the compression amount of the pile. The hammer drop height can be increased as long as the pile compression original working load capacity does not exceed its pile material.

Data Assessment and Result

After the strain and acceleration transducers are attached to the pile and the computer system, these transducers record the pile top force and the velocity with respect to time data during the hammer is on vertical pose on top of the pile head. The data obtained is digitized and stored in a hard disk. The data is also displayed on the screen which allows it accessing in the field. Those random data will be automatically generated for further analysis in office use. The digitized information is operated by the computer programmed to a number of parameters. These parameters include the energy transmitted past the transducers, estimated driving resistance, and also estimated static resistance.

Signal Matching

The force and velocity signals obtained in the field will be displayed during the test. However, a more accurate, independent measurement of the applicable soil damping factor will later be determined by using the CAPWAP or TNOWAVE signal matching computer program. The pile and soil dynamic models will then be used to identify the skin distribution along the length of the pile. The static pile load settlement can also be predicted by removing the dynamic components of the models.

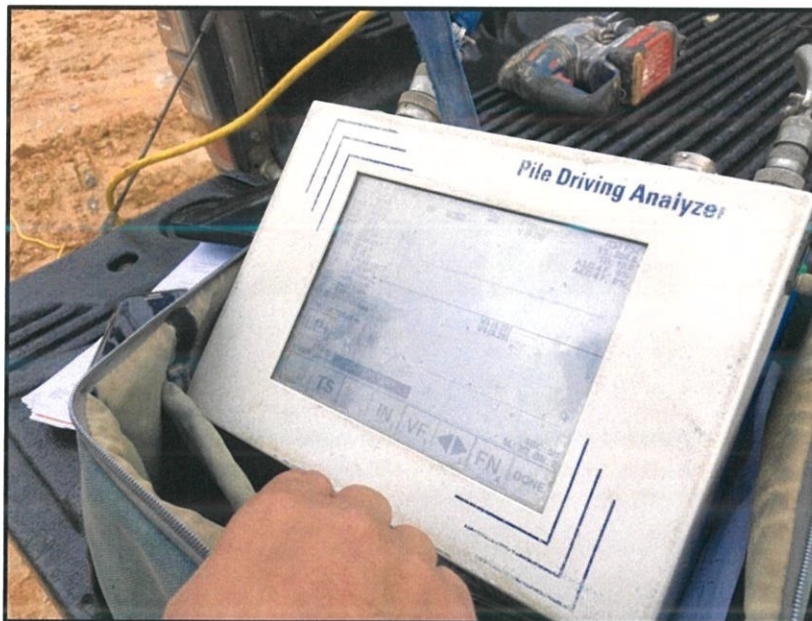


Figure 3.28: Signal Matching

3.4 Hazards That Occurred and Risk Management During Piling Works

Job Sequence	Hazard	Risk Category	Control Measures
1) Arrival of piling machine	<ul style="list-style-type: none"> - Struck by vehicle - Lose control due to slippery and uneven road - Collision of vehicle - Accident due to low visibility 	<ul style="list-style-type: none"> - Body injury - Death or multiple death 	<ul style="list-style-type: none"> - Valid driving license for vehicle or trailer. - The vehicle must be inspected and maintained. - Ensure the ground is safe and accessible by providing steel plate.
2) Auger connection and drilling	<ul style="list-style-type: none"> - Hand stuck to rotating blade - Slip-trip-fall into drill hole or due to ground condition 	<ul style="list-style-type: none"> - Hand injury - Body injury 	<ul style="list-style-type: none"> - Machine must be operated by competent operator. - Site supervisor and engineer to ensure the workers are at a safe distance. - Appropriate PPE attired.
3) Lifting up pile	<ul style="list-style-type: none"> - Falling of pile due to wire rope snap or poor ground condition 	<ul style="list-style-type: none"> - Body injury 	<ul style="list-style-type: none"> - Inspect sling before using “Lifting gear Inspection Form”. - Crane operator shall communicate fully with signalman during the lifting work especially when the view is blocked

			<p>from the field of view.</p> <ul style="list-style-type: none"> - The works shall not be carried out under extreme weather.
4) Driving pile	<ul style="list-style-type: none"> - Noise exposure - Hit by broken pile body or chip-off pile - Neighboring building cracks or structurally affected 	<ul style="list-style-type: none"> - Hearing impairment - Eye and head injury - Building collapse 	<ul style="list-style-type: none"> - Visual inspection by supervisor in charge to make sure no defects on the pile before and during driving. - All persons to be trained in the correct use of ear plug or ear deference. Noise monitoring to be conducted by third party. - While driving the pile, workers must be in safe distance for at least 1 meter apart unless for the welding parts.

CHAPTER 4.0

CONCLUSION

Pre-boring works and piling installation is actually to increase and strengthen the soil composition. The process and the method statement of this deep foundation need to follow the method properly to avoid from any hazardous or unwanted things to occur. The designed method is actually based on the earthwork's result which consists of Mackintosh Probe Test, soil investigation and soil test. One of the main precautions that had been applied on this project is the material is in a good state and the machines need to be in a good condition according to its major operation and services.

In completing this report, the method construction applied are explained in detail. The installation starting from the surveying works is to get the actual coordinate following by pre-bore works within specified auger diameter and the verticality of piling installed before driven them until the end bearing.

Machinery such as pre-bore machine, pile driver, excavator and also surveying tools are required throughout the project duration. Surveyors, pile operators, pre-bore operators, pile recorder, and site supervisor plays their role in own ways in order to make sure the project runs smoothly. All these method construction and site workers actually can obtain new experiences and also to develop new skills from phase to phase.

Moreover, risks and hazards that came through while running this project is mainly focused on the weather, piles that are broken during the driven works, collapsing pre-bore hole, and more. In addition, those problems could delay and increase the cost of construction items. Fortunately, they had managed to overcome and reduce the effects all of these problems

The method used for this works is actually different than any other types of pile. Normally, pre-boring works is generally suitable for a bore pile installation. Nevertheless, the result of the soil factor had to make this method changed after all. Hence, all types of pile used in this project needs to be pre-bore first in order to achieve its end bearing.

Lastly, the safety and health parts can be concluded that this construction site area is in a safe condition. Although there are certain workers that do not follow the instructions of Personal Protection Equipment (PPE), there are no injuries recorded to all parties involved. Therefore, it is important for everyone in the site to make sure to take safety precaution regarding the piling works its installation.

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(W., Pile Load Capacity Calculation Method, 2015)

yadda.icm.edu.pl/yadda/element/bwmeta1

APPENDICES

BUKIT INDAH

the address

Our Ref : BI1/BIJSB/CA/PIL-005/19-001
Date : 18th July 2019

JURUTERA JRK SDN.BHD. ✓
No. 7, Block C,
Kompleks Austin Perdana,
Jalan Austin Perdana 2,
Taman Austin Perdana,
81100 Johor Bahru,
Johor DarulTakzim.

ATTN: IR. LEE WEI SHIONG ✓

Dear Sir,

**PILING WORKS FOR CADANGAN PEMBANGUNAN BERSTRATA KOMERSIAL
BERCAMPUR (SKY TREES) YANG MENGANDUNGI :-**

- I) 1 BLOK PANGSAPURI PERKHIDMATAN - BLOK A 19 TINGKAT (228 UNIT)**
- II) 1 BLOK PANGSAPURI PERKHIDMATAN - BLOK B 20 TINGKAT (240 UNIT)**
- III) 5 TINGKAT PODIUM YANG MELIBATKAN :**
 - (a) 2 TINGKAT TEMPAT LETAK KERETA BERSERTA 26 UNIT RUANG
PERNIAGAAN**
 - (b) 2 TINGKAT TEMPAT LETAK KERETA BERSERTA KEMUDAHAN ASAS**
 - (c) 1 TINGKAT TEMPAT LETAK KERETA BERSERTA 12 UNIT PANGSAPURI
PERKHIDMATAN DAN KEMUDAHAN**

**DI ATAS SEBAHAGIAN PTD 182919, BUKIT INDAH, ISKANDAR PUTERI, MUKIM
PULAI, DAERAH JOHOR BAHRU, JOHOR DARUL TAKZIM FOR M/S BUKIT INDAH
(JOHOR) SDN BHD**

(CONTRACT NO. : BIJSB/PIL-19/C635) ✓

-Letter of Confirmation -

We are pleased to inform that the Tender submitted by Messrs. Chuan Luck Piling Sdn Bhd for the above-mentioned works for the sum of *Ringgit Malaysia : Five Million Eight Hundred Seventy Thousand Four Hundred and Seventy Three Only* (RM5,870,473.00) has been accepted subject to their acceptance of the following terms and conditions:-

1. That the accepted tender sum shall be derived as per **Attachment A**; ✓
2. That this Letter of Confirmation shall be read together with the Scope of Works and conditions as stipulated in the Tender Documents, all correspondences between the Client and the Contractor prior to the award of this Contract. ✓
3. That notwithstanding the above, all inconsistencies and unreasonable rates to be adjusted are to the Superintending Officer's or S.O. satisfaction provided that the accepted tender sum remains unchanged; ✓
4. That any discount shall be applied as a percentage adjustment to all the rates on the accepted tender sum, after deducting all Prime Cost Sums and Provisional Sums (including all adjusted / rationalized rates); ✓

BUKIT INDAH (JOHOR) SDN BHD (387266-9)
Tropika Welcome Centre, Level 3A, No. 10, Jalan Setia Tropika 1/21, Taman Setia Tropika,
81200 Kempas, Johor Bahru, Johor Darul Takzim, Malaysia.
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5. That the accepted tender sum is on a Firm Basis and not subject to any price fluctuation; ✓
 6. That the accepted tender shall be based upon the basic tender as submitted by the Contractor; ✓
 7. That the Date of Commencement and possession of the site shall be on 1st August 2019; ✓
 8. That the Date for Completion shall be SIX (6) MONTHS from the date of site possession, which shall be inclusive of mobilization, site clearing, all Festivals, Public Holidays and wet weather. The date of completion for the whole of the works under this contract shall be on 31st January 2020; ✓
 9. That the Liquidated Damages of RM6,000.00 (Ringgit Malaysia : Eight Thousand Only) per calendar day shall be imposed in the event the Contractor is unable to complete the works within the time prescribed in Clause 8 above or within any extended time granted; ✓
 10. That the following conditions pertaining to the Contract shall be applicable:-
 - a) Period of Interim Certificate Monthly ✓
 - b) Joint Site Measurement Date 1st of every month ✓
 - c) Period of Honouring Certificate Thirty (30) days ✓
 - d) Percentage of Certified Value Retained 10% of Gross Valuation ✓
 - e) Limit of Retention Fund 5% of Contract Sums or Revised Contract Sums whichever is higher. ✓
 - f) Defect Liability Period Twelve (12) months from the date of issuance of Certificate of Practical Completion ✓
- Failure in complying and / or submitting incomplete documentation will render in late certification and payment wherein the Employer shall not be liable thereof.
11. Interim certificate issued by Consultant / S.O. shall not be considered as conclusive evidence as to the sufficiency of any work, equipment, materials or goods to which it relates, nor shall it relieve the Contractor from his liability to amend and make good all defects, imperfections, shrinkages, or any other faults whatsoever. In any case, no certificate of Consultant / S.O. shall be final and binding in any dispute between the Employer and the Contractor if the dispute is brought whether before an arbitrator or in the courts. ✓

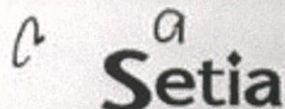
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Date : 18th July 2019

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12. That the performance bond amounting 5% of the Contract Sum, Ringgit Malaysia: Two Hundred Ninety Three Thousand Five Hundred Twenty Three and Cents Sixty Five Only (RM293,523.65), as required for this project shall be submitted in the approved format before the commencement of works on site; the Performance bond shall remain valid and effective until the issuance of the Certificate of Practical Completion by the S.O. In the event the Contractor does not submit the Performance Bond, the Employer reserves the right to withhold the value of the Performance Bond from progress payment certificate or any money due to the Contractor.
13. That no work shall commence on site until all required and approved insurance coverage have been taken, copies of cover notes shall submit within 7 days and proof of premium paid is submitted within 60 days; the original copy of the insurance policy and original receipt for premium paid shall be given to us for safekeeping. In the event such required insurances are not taken by such time as the S.O. thinks appropriate, the S.O. shall have the right but not the obligation to secure such insurances on such terms as the S.O. deem appropriate and all cost shall be borne by the Contractor. The insurance policies to be taken are:-
 - a) Contractor's All Risks Policy in respect of Insurance against Injury to persons, property, Employer Indemnity and Damage to the Works;
 - b) Workmen's Compensation Insurance;
 - c) Foreign Workers Compensation Scheme;
14. That the Contractor shall submit for the S.O.'s & Employer's comment within 2 weeks from date of site possession the following:-
 - a) a site management and supervisory personnel organization chart indicating the name, qualification, experience and position of each of the key personnel;
 - b) two copies of detailed Work Programme, consisting of Gantt charts with critical path analysis;
 - c) a schedule indicating when the various Nominated Sub-Contractors or Nominated Suppliers are expected to commence work or commence delivery of their goods;
 - d) a detailed work method statement including location plan for store, site office, etc;
 - e) the acknowledgement receipt of the application form for Construction Industry Development Board (CIDB) levy and to submit the receipt of payment of levy within 2 months upon date of commencement.
15. The Contractor shall ensure that the work, finishes and products for the project shall be the best, executed by experienced and skilled workers in their respective duties for which they are being employed. Decisions as to the quality of materials and workmanship in cases of disputes shall rest solely with the S.O. The Contractor shall also comply fully with all the requirements of the ISO 9000 Quality Management System. Should the Contractor fail to comply to this, the Employer reserves the right to arrange for making good all works not in compliance to the required quality standards and the cost of all such remedial works shall be borne by the Contractor and shall be deducted from any sum due or to become due to the Contractor (i.e. monthly progress payment);


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16. That the Contractor shall apply and obtain for storage permits with the Ministry of Internal Trade and Consumer Affairs on controlled items, such as steel bars, cement and diesel, as and when required under the Control of Supplies Regulations Act 1974. Copies of such permits shall be forwarded to Developer for records. You shall indemnify the Employer in full against fines, penalties, any costs and expenses (including legal fees) incurred by the Employer for your failure to apply and obtain storage permits;
17. The Employer reserves the right to omit any of the items or works specified or part(s) thereof and the contract sum shall be adjusted accordingly. The Contractor shall not be entitled to any compensation for loss of profit and/or expenses on such items or works omitted.
18. The directors of the Contractor's company shall be fully involved during the execution of the Contract. If the Contractor should fail to comply with this requirement, the Employer reserves the right to determine the Contractor's employment under this Contract and the Contractor shall have no rights of claims pertaining to this termination except for the value of work done up to the date of termination only.
19. That the Contractor shall endeavor to maintain a high level of cleanliness and enforce proper safety and health regulations on the site at all times. Should the Contractor failed to comply to the above, the Employer reserves the right to arrange all necessary action to remedy the situation and all cost incurred shall be borne by the Contractor and to be deducted from any sum due or to become due to the Contractor (i.e. monthly progress payment).
20. The accuracy of setting out shall be entirely the Contractor's responsibility and that the Contractor shall make good at the Contractor's own expense any errors that may arise from any cause, and that upon completion of the Contract/Works, a licensed Land Surveyor to be engaged by the Contractor to conduct a final survey.
21. The Contractor shall make due allowance for sharing the site with other Contractors and that the Contractor will permit them to work within the same site as and when directed by us. This allowance, which is deemed to be included in the Contract Sum, shall be reflected in the work programme as and when requested.
22. The Contractor is deemed to have examined and inspected the site and shall take over the site as it is and shall be responsible to employ and use proper techniques and equipment in carrying out the Contract so as to complete the whole of the Contract on / before the Date of Completion. The Contractor hereby acknowledges that the possession of site may given in sections or in parts as stated in para 7 and subject to any others restrictions which may be imposed by the Employer. No claim by the Contractor for additional payment or extension of time will be allowed.

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23. The Contractor is to ensure that the Contractor's site representative and workers abide strictly by the rules set by us with regards to safety regulation, clearing and cleaning programme etc. The Contractor is to observe all rules and security regulation currently enforced on site by the relevant authorities. The Contractor's site activities shall be confined to within the designated area only. No trespassing into non-designated area is allowed. The Contractor shall be responsible and shall indemnify the Employer against all proceeding, fines imposed etc., should the Contractor fail to comply with the relevant rules and regulation.
24. The Contractor shall employ and maintain on site the personnel as listed in the Contractor's organization chart submitted to the Employer (as stated in **para 14.a**) on a full time basis. The number of personnel listed therein shall be the minimum quantity required on the site throughout the duration of the Contract. A full time representative who is able to coordinate the work and make decision on behalf of the Contractor's organization shall at all time be stationed on site. The Contractor shall remove from site any such workman (or workmen), and / or personnel who is incompetent or has misbehaved or refused to receive our instructions and deemed unfit to work on the Contract / Works. Any person who has left and / or removed from the Works shall be immediately replaced with a competent substitute. If the Contractor fails to provide the personnel listed in the aforesaid document, we, and / or S.O. may engage suitable candidates on the Contractor's behalf and all expenses incurred thereof shall be borne solely by the Contractor.
- The Contractor is responsible for the strict observance of the prevailing and/or any new Labour Law that is in force or may be enforced in Malaysia and shall indemnify Employer against all claims.
25. All information, documents and transmittals issued or generated by **Bukit Indah (Johor) Sdn Bhd**, and / or its representative during the course of work shall not be transmitted to any third party without the prior written approval of **Bukit Indah (Johor) Sdn Bhd** and / or its representative.
26. The Contractor shall attend all the site meetings to be called by the S.O. for the purpose of monitoring and coordination of various Contractors' works. Attendance at these meeting is compulsory and shall be attended by personnel who are well versed with the Contract / Works and progress of Works and authorized to make decision on behalf of the Contractor's company. The Contractor shall inform Nominated sub-Contractor when their presence at the meeting is required.
27. S P Setia's "**POLICY AND CODE OF CONDUCT GOVERNING CONTRACTORS DURING DEFECT LIABILITY PERIOD**" shall form part of this Contract. All visible defects identified shall be rectified immediately, regardless if it is a minor defect. The Works will not be deemed practically completed and no CPC will be issued unless all defects including minor visible defects are rectified.

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28. Termination Clause

The Employer reserves the right to determine this Contract with the Contractor, if in its sole opinion, the Contractor fails to proceed regularly and diligently with the Works in any of the following manner:

- a) Failure to remedy the delay in the Contractor's Works progress when the delay is more than 20% measured by value or time, whichever is earlier;
- b) Failure to submit Contractor's Work Programme within 2 weeks of the Contractor's receipt of the Letter of Acceptance / Award;
- c) Failure to propose measures to overcome a delay of 10% or more of the Contractor's Work Programme upon issue of a notice by the Superintending Officer of such a delay;
- d) Refusing or persistently neglecting after notice in writing from the Consultant / S.O. requiring the Contractor to proceed with the works;
- e) Refusing or persistently neglecting after notice in writing from the S.O. requiring the Contractor to remove defective works or improper materials or goods and / or to carry out all necessary remedial works within reasonable time and by such refusal or neglect the works are materially affected.

Then the Superintending Officer may serve the Contractor notice by registered post or recorded delivery specifying the default and if the Contractor continues such default for seven (7) days after such notice or shall at any time thereafter repeat such default, the Employer may, without prejudice to any other rights or remedies, terminate the Contractor's employment under this Contract without further notice. In the event of such termination, no consequential loss of profit or expense or any loss and expense whatsoever shall be claimed against the Employer.

Upon the termination of this Contract, the Contractor shall forthwith redeliver to the Employer possession of the site and the Employer may, but without obligation allow any third party to complete the Works. In such event, the Contractor agrees not to make any claim against the Employer under this Contract or for any breach, nor raise any excuse, set off or defense with respect to any debt or claim made by the Employer against the Contractor.

29. Any dispute or differences arising out of or in connection with this Contract / Works or the implementation of any of the provisions of this Contract / Works which cannot be settled amicably shall be submitted to arbitration and the reference shall be to a single arbitrator to be jointly appointed by both parties.

If the parties do not concur in the appointment of the arbitrator, then the arbitrator shall be appointed by the President, for the time being, of the Regional Centre for Arbitration, Malaysia who shall have the like powers to act in the reference as if he had been appointed by consent of both parties to this agreement. The decision and award of the arbitrator shall be final and binding on both parties.

Save as provided above, the provisions of the Arbitration Act, 1952 (revised 1972) of Malaysia or any statutory modification or re-enactment thereof for the time being in force shall apply to such arbitration.

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Date : 18th July 2019

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30. Any notice, request or demand required to be served by either party hereto to the other under this Contract shall be in writing and shall be deemed to be sufficiently served:

- a) If it is sent by the party or his solicitors by registered post addressed to the other party's address herein before mentioned and in such case it shall be deemed to have been received upon the expiry of a period of five (5) days of posting of such registered letter; or
- b) If it is given by the party or his solicitors by hand to the other party or his solicitors.

Any change of address by either party shall be communicated to the other.

31. All as-built drawings to be submitted before the issuance of the Certificate of Practical Completion. ✓

32. That the following issues were raised including deviations from the tender questionnaire prepared during tender interview shall constitute part of the amendments to the contract:-

- a. Any unpriced item or exclusion stated in Bill of Quantities is **NOT ACCEPTABLE**. It shall be deemed inclusive; ✓
- b. The Clerk of Work's / Supervisory staff's overtime wages shall be borne by the Contractor; ✓
- c. Stamp duty for Contract binding shall be borne by the Employer; ✓
- d. No temporary worker's quarter is allowed to construct at or within the site; ✓
- e. The Contractor is to comply with the requirement by CIDB that all skilled construction labours and supervisors, whether local or foreigners (exclude general workers) must obtain competency certificate (effective from 1st June 2016); ✓
- f. The Contractor is required to submit all necessary As-built Drawings in 5 sets of hardcopy and softcopy in CD including photographs as described in the Contract Documents prior to issuance of Certificate of Practical Completion; ✓
- g. No EOT shall be granted due to weather issues. Unless it is due to exceptionally inclement weather where the Contractor shall submit relevant published statistics from nearest Meteorological Station (or other approved reliable source close to the location of the Works) and an analysis to show that the condition of weather is classified as exceptionally inclement weather and shall subject to S.O. approval; ✓
- h. The Contractor is required to construct and maintain new project signage; ✓
- i. The Contractor is required to maintain the existing hoarding; ✓

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- j. The Contractor is required to construct and maintain wash trough. The Contractor shall, in particular, liaise with other Contractors on matters of shared access, common security, keeping roads, access way and drains free from debris and mud and protection of the Works including those by others. Co-ordinate all related works to minimize obstructions and hindrances. The Contractor is required to share the cost of maintenance of access roads to the site. Cost apportionment of these works shall be carried out by the Employer based on frequency of usage and Contract value; .
- k. The Contract price shall include all taxes (including but not limited to Sales & Service Tax) and import duties. No adjustment shall be made to the Contract Sum should there be any introduction of new taxes, fluctuation in the rates of the existing taxes, import duty, exchange rates and etc during the Contract period and its extended period; .
- l. All Pre-stressed piles deliver to the site must be at least of 28 days with the following strength :-
- i. RC Pile - 45N/mm²
 - ii. SPUN Pile - 80N/mm²
- In the event that the Pre-stressed piles delivered are less than 28 days strength, the Client reserves the right to carry out additional core test to determine the strength. The cost for testing shall solely born by the Contractor;
- m. The Contractor shall carry out the coring test (minimum 3 samples) to ensure the piles delivered to site are in good quality and the testing is to be conducted by an independent lab and witnessed by Employer's representative and Engineer; .
- n. In the case the coring test fails, Engineer reserves the rights to reject the pile supplier. The Contractor is required to re-submit new supplier for Engineer's approval. Any delay due to this shall not be entitled for any extension of time; .
- o. The Contractor is fully responsible to double check the eccentricity of the boundary stones before commencement of the piling works; .
- p. The Contractor shall provide the counter to determine the number of blow (hydraulic hammer) and record in the piling sheet record; .
- q. The additional replacement piles for broken, tilted and unset piles due to piling contractor's fault are payable to 1 no of shortest pile; .
- r. All load test which failed due to ground conditions after verification that there is no problem with pile structure strength, pile inclination and deviation, and pile integrity (from PDA test results), shall be payable by the Client. However, where the scenarios are not due to the ground conditions shall be deemed not payable; .
- s. Proper traffic management plan shall be provided during the Contract period. Contractor shall submit the traffic management plan for Consultant's approval; .

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- t. All alternative proposal (if any) shall be approved by the Consultants / Employer prior to tender submission. All alternative proposal by the Contractor shall be in Lump Sum and not subject to any re-measurement;
- u. The Contractor is to note that he will only be paid once for the cutting of pile heads to the required level even if it had taken him more than one operation to complete the task. Rates for all types of piling shall include:-
- Non-reusable cut-off lengths and removal from site.
 - Re-driving of heaved pile.
 - Penalty pile.
 - All necessary excavation, filling and removal of spoil incidental to piling.
 - Normal standing time.
 - Delay due to weather.
 - Preparation and submission of piling record and as-built drawings.
 - Wastage of piles. The average pile penetration length from existing ground level is estimated based on borehole results. Actual length is to be determined on site.

v. C&S Consultant's Clarifications:-

- The Contractor is to cooperate and work closely with other contractors at the site;
- The Contractor is required to submit the piling record in detail;
- The Contractor shall submit the method statement for Maintain Load Test (Kentledge), dynamic pile test (PDA) and prebore;
- The Contractor is responsible to provide remedial proposal to the Engineer for approval if there is any defect, failure or eccentricity out of tolerance on the piling works. The remedial proposal shall be endorsed by professional engineer (PE);
- The Contractor shall bear the cost for the enlargement of the pile cap and additional piles if the pile is deviated more than 75mm.
- If there is any damages to neighbouring properties due to the works carry out at site, it is the responsibility of the Contractor to rectify or compensate the property owner. All complaints from adjacent property owner must be attended immediately and speedily;
- The Contractor is to submit the source or the name of the supplier of concrete pile to be used including all relevant testing certificates;
- The Contractor is required to submit the quality control certificates (SIRIM) for all proposed construction materials for Engineer's approval prior to commencement of works;
- The Contractor's full time site surveyor shall provide all pile points setting out and to be verified by Client prior to commencement of boring works;


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