



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

**THE CONSTRUCTION OF BORED PILE  
(SUBSTRUCTURE)  
FOR  
CONDOMINIUM TRINITY PENTAMONT, MONT KIARA**

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FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING  
UNIVERSITI TEKNOLOGI MARA  
(PERAK)**

**JULY 2019**

It is recommended that the report of this practical training provided

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**Entitled**

**THE CONSTRUCTION OF BORED PILE  
(SUBSTRUCTURE)  
FOR  
CONDOMINIUM TRINITY PENTAMONT**

Accepted in partial fulfillment of requirement has for obtaining Diploma In Building.

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**DIPLOMA IN BUILDING**  
**FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING**  
**UNIVERSITI TEKNOLOGI MARA**  
**(PERAK)**

**JULY 2019**

**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, prepared during a practical training session that I underwent at Trinity Group Sdn Bhd for duration of 14weeks starting from 25 February 2019 and ended on 31 May 2019. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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DATE : 31 MEI 2019

## **ACKNOWLEDGEMENT**

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I would like to extend my heartfelt gratitude for the guidance, advice and help rendered throughout the period of training by the following group of amazing individuals. First and foremost, I would like to thank Dato' Neoh Soo Keat for the opportunity given, to conduct my training in his esteem company. His team of professionals comprising Mrs Sylvia Tan, Mr Tan Keng Ping and Mr Tham Kok Teng, have enabled me to learn and develop my understanding, knowledge and feel of real time projects, and the theory involved in analysis of structured, building and civil works. They are also responsible towards streamlining and assessing my training. Also to the site personnel in both Trinity Pentamont and Choice Approach Sdn Bhd who extended their cooperation and help to further enhance my ability in understanding the procedures in construction and site administration, tests procedures, site safety and best practices in the industry. It is an honour for me to be given the opportunity to 'work' with all of you.

I would also like to thank ALL the UiTM lecturers that have taught and nurtured me in becoming a better student and person. I would also like to extend my deepest appreciation to the lecturers who are directly involved during my training stint. To Dr. Ida Nianti Binti Mohd Zain, as Supervisor Lecturer, En. Muhammad Naim Bin Mahyuddin, Practical Training Coordinator and Dr. Dzulkarnaen Bin Ismail, Programme Coordinator, I value the time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and valuable knowledge have been shared over the last few semesters.

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

Thank you so much.



## **ABSTRACT**

Bored piles are commonly used as foundation in Malaysia to support heavy loaded structures such as bridges and high-rise buildings in view of its low vibration, low noise, and flexibility of sizes to suit different loading conditions and subsoil conditions. This report will explain about the process of piling and method used to construct bored piles in substructure construction of Condominium Trinity Pentamont, Mont Kiara. Hence, the objective of this report is to identify issues and problem occurred in the construction of bored pile. The methodologies of this report is conduct visual inspections on current conditions at the site to figure out the method and solutions to overcome the problems that occur at the site. Cooperation between the authority of Jabatan Ketua Kampung and management is the key factor in the successful completion of the issues occur in construction of bored pile.

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## **CHAPTER 1.0**

### **1.1 INTRODUCTION**

Bored piles are commonly used as foundation in Malaysia to support heavy loaded structures such as bridges and high-rise buildings in view of its low vibration, low noise, and flexibility of sizes to suit different loading conditions and subsoil conditions. This such attributes are especially favoured in urban areas where strict restricted with regards to vibration and noise are imposed by relevant authorities which restricted the use of other conventional piling system, for example driven piles. Other than that, bored pile also can be defined as the structural works that are constructed below ground level. Therefore, bored pile also one of the components of the substructure is an under laying or supporting structure to superstructure from below ground level.

Bored piling methods and activities also include installing steel reinforcement, boring a circular hole into the ground, and filling the bore hole with concrete to form a proper pile. Moreover, bored pile foundation are also suitable for all types of soil conditions and compared with conventional driven piling methods, bored piling activities generate less vibration and noise at the same time.

## **1.2 Background and Scope of Study**

The scope of study for this report is essential as the writer can get into the details specifically and concentrate on that idea only. In this case study, the scope of work is concentrated on how overcome the issues in construction of bored pile in sub-structure construction applied in Condominium Trinity Pentamont, Mont Kiara. This scope of study also explains in detail the process for the installation of the pilling, method for the installation of the bored piles and the inspection test.

Bored pile is one of the Substructure element of a building that supporting the load of building from the ground. This includes foundations and basement retaining walls. The lowest artificially built part of a structure which transmits the load of the structure to the soil lying underneath.

This project was started on 12 April 2018 until 11 December 2019 for this substructure construction and this project has been handle by Choice Approach Sdn Bhd to construct the substructure in Condominium Trinity Pentamont.

## **1.3 OBJECTIVE**

The aim of the report is to gain knowledge and to explore the process of bored pile in substructure construction of 41 storey building at Condominium Trinity Pentamont. Therefore, there are two objective have been identified :-

1. To study the process and method to construct bored pile in substructure construction.
2. To identify issues or problem occurred in the construction of bored pile.

## **1.4 Method of Study**

There are three method of study were used to complete this report which is by making a research about the topic of the project, make an observation on construction site and interviewing the senior contractor at the site.

### **1.4.1 Literature Study**

To conduct this study, there are several ways had been used to in literature study to complete this report which are website and books. Throughout this literature study, website and books had a lot of information to be made as references. This method is more productive to gain some idea and understand in detail to overcome issues in the construction of bored pile.

### **1.4.2 Observation**

The writer making an observation on the environment of the construction site and observe the work progress of the project during working hours. Other than that, the writer observe and learn the ways to handle a construction site such as machineries, test and labours. The writer learn and understand the construction drawing to be apply on the construction site. Other than that, making an observation to all element such as piling work, concreting work and how the installation of that element done by labours. Writer also make and observation on how the bored pile machines being operated.

### **1.4.3 Interview**

Interviews being conducted on site during working hour. This method can provide a lot of accurate information by interviewing the labours or interviewing the senior contractor in the company team. The site manager, Mr Ho gives the writer a lot of valueable information about this site work. Through this method, it helps the writer to gain more knowledge, idea and also to gather information about the research topic of this report.



## CHAPTER 2.0

### COMPANY BACKGROUND

#### 2.1 Introduction of Company



**Company Logo of Trinity Group Sdn Bhd**

Trinity Group reflects the beliefs of its Founder and Managing Director, Dato' Neoh Soo Keat, that luxury living should not be the privilege of a few. Within a short span of 16 years under his stewardship, Trinity Group have charted success stories on the Klang Valley skyline with an impressive portfolio of serviced apartment, iconic residential and industrial developments that scale new heights in elegant, innovative and affordable urban living.

Furthermore, Trinity Group Sdn Bhd established in 2004 and has emerged as one of the premier developers in Malaysia which helmed by self-made entrepreneur, Dato' Neoh Soo Keat. Trinity has built a solid reputation of bringing affordable luxury living to its customers, with features such as premium facilities, strategic locations and value-added infrastructure being the cornerstone of its developments. Primarily developing in the mid-range category, Trinity Group's projects are known for its good investment value with high capital appreciation potential.



This company deeply rooted in its philosophy, which is “Building Communities, Enriching Lives”, Trinity Group also stands out among other developers of its class for its integrated marketing approaches and innovative product range. Other than that, Trinity Group is constantly aiming and evolving to be on the cutting edge of living concepts and modern trends to enhance the lives of its customers and the community it serves. Trinity Group has also made national history by constructing Malaysia’s First Air-conditioned bus stop, certified by the Malaysian Book of Records.

Moreover, other awards and recognition that earned by Trinity Group is “Best Enterprise” by Europe Business Assembly 2012, “Best New Developer” by the Malaysian Reserve Editors Choice Property Award 2012 and “Value Creation Excellence Award 2013 & 2015 – Residential” by the edge. Besides that, Trinity Group stands out from the rest by offering innovative and stylish living concepts clearly exemplified by signature developments such as The Zest at Kinrara 9, The Z Residence at Bukit Jalil, Trinity Aquata at Sungai Besi Expressway and the upcoming projects, Trinity Lemanja at Kepong and Trinity Pentamont at Mont Kiara. Last but not least, Trinity Group also has invested RM 7 million to build a directional ramp which connected the main road and The Zest at Kinrara 9 to facilitate easy accessibility for The Zest’s purchaser and their staff.

## 2.2 Company Profile

**Table 2.1.** Company Profile

Company Name	TRINITY GROUP SDN BHD
Main Address	ZP-10, Zest Point, Lebuhraya Bukit Jalil, BK9, Bandar Kinrara, 47180 Puchong, Selangor
Telephone Number	
Fax Number	
Email	<a href="mailto:enquiry@trinitygroup.com.my">enquiry@trinitygroup.com.my</a>
Website	<a href="http://www.trinitygroup.com.my">www.trinitygroup.com.my</a>
Year of Incorporation	2004
Company's Licensed	2120111200183
Company Registration No	650042-P
Bank	CIMB Bank
Grade	G7
Company Secretary	Morrison
Bored of Director	Dato' Neoh Soo Keat Datin Guan Len Hua

## 2.3 Organization Chart

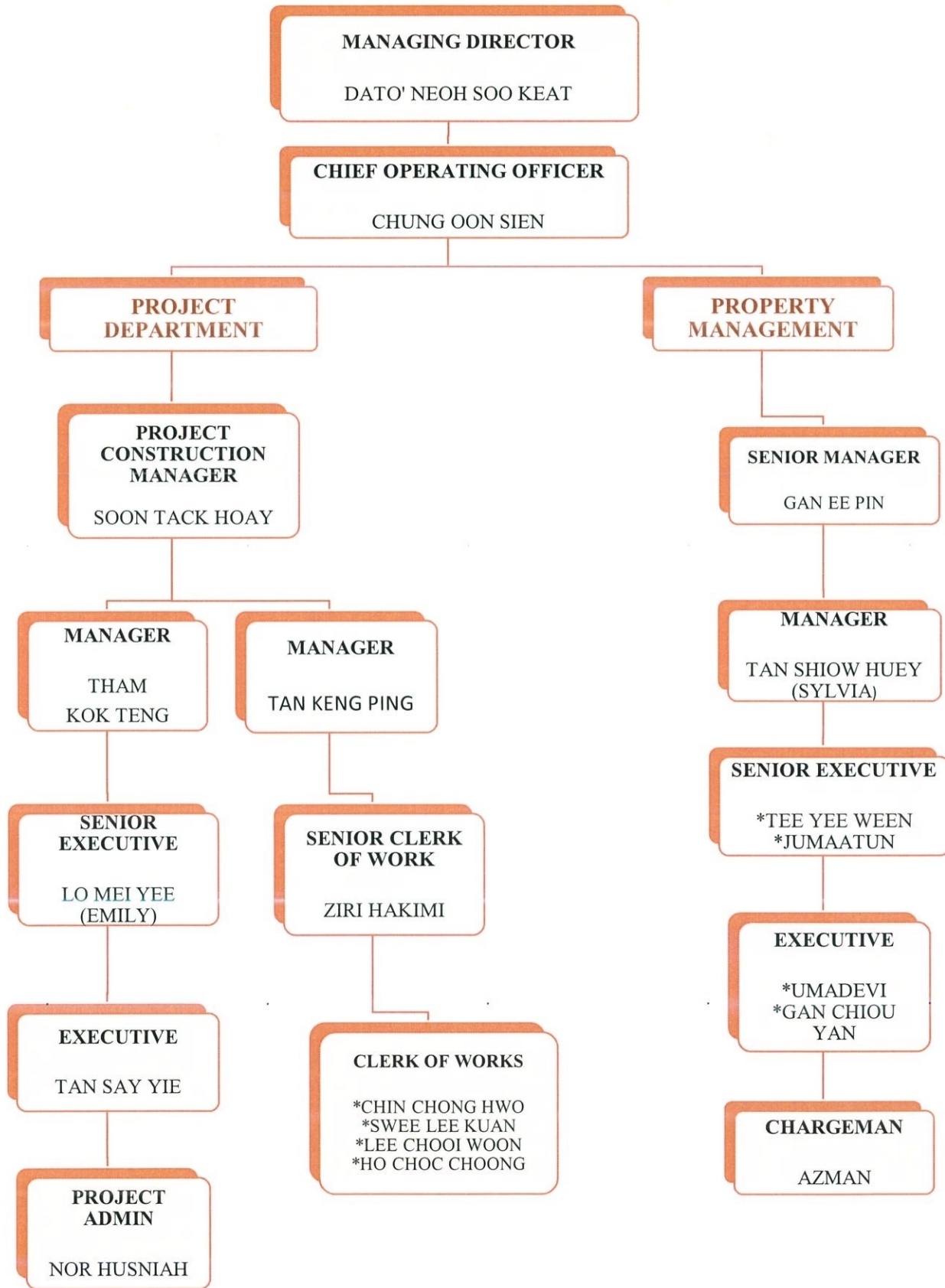


Figure 2.1 Organization Chart

## 2.4 List of Projects

**Table 2.2** List of Completed Projects

NO	TITLE OF PROJECT	CONTRACTOR	COST PROJECT
01.	<p><i>Cadangan Pembangunan Bercampur Yang Mengandungi 3 Blok Komersial 'Service Apartment' 720 Unit Mengandungi :</i></p> <p><i>A) Blok A - 20 Tingkat (240 Unit Kediaman)</i></p> <p><i>B) Blok B - 20 Tingkat (240 Unit Kediaman)</i></p> <p><i>C) Blok C - 20 Tingkat (240 Unit Kediaman)</i></p> <p><i>Dan 5 Tingkat Podium – Aras Tempat Letak Kereta Termasuk Kemudahan Seperti Berikut:</i></p> <p><i>I. Sebuah Rumah Kelab (Termasuk Dewan, Dewan Bacaan, Tadika Dan Surau)</i></p> <p><i>II. Kolam Renang Dewasa &amp; Kanak-Kanak</i></p> <p><i>III. Kedai Pejabat 24 Unit Di atas Lot PT 5469, Mukim Kinrara, Daerah Petaling, Selangor Darul Ehsan Untuk Darul Dinasti Sdn Bhd.</i></p> <p><i>(The Zest Apartment)</i></p>	<p>JASMURNI CONSTRUCTION</p>	<p>RM 123,097,211.57</p> <p><b>Duration Project :-</b> (7 October 2011 – 14 November 2012)</p>



02.	<p><i>Cadangan Pembangunan Pangsapuri Yang Mengandungi :</i></p> <p>A) Blok A – 26 Tingkat (268 Unit)</p> <p>B) Blok B – 26 Tingkat (322 Unit)</p> <p>C) Blok C – 27 Tingkat (281 Unit)</p> <p>D) Blok D – 26 Tingkat (265 Unit)</p> <p><i>Diatas 1 Tingkat Podium Dan 4 Tingkat Bawah Aras Jalan Untuk Tempat Letak Kereta Serta Kemudahan Penduduk Dan 1 Unit Pencawang SSU TNB Di Atas Lot 3000, Mukim Petaling, Kuala Lumpur Untuk Tetuan Darul Dinasti Sdn Bhd.</i></p> <p>(The Z Residence)</p>	<p>PUTRA PERDANA CONSTRUCTION SDN BHD</p>	<p>RM 160,000,000.00</p> <p><b>Duration Project :-</b> (June 2011 – July 2014)</p>
03.	<p><i>Cadangan Pembangunan Perusahaan Yang Mengandungi :-</i></p> <p>A) 12 Unit Kilang Berkembar Jenis A</p> <p>B) 2 Unit Kilang Berkembar Jenis B</p> <p>C) 1 Unit Kilang Sesebuah Jenis C</p> <p><i>Di atas PT2614 (HSM 17458) Dan Lot 64689 (PM 1968) Mukim Petaling, Daerah Petaling, Selangor</i></p>	<p>ENG HAN BINA SDN BHD</p>	<p>RM 22,920,000.00</p> <p><b>Duration Project :-</b> (11 January 2013 – 2014)</p>



	<i>Darul Ehsan Untuk Kensington Vision Sdn Bhd</i>  (Latitude)		
04.	<p><i>Cadangan Membina Bangunan Campuran 29 Tingkat Yang Mengandungi :-</i></p> <p><i>A) Blok A – 15 Tingkat Pangsapuri Service Di Atas Podium (210 Unit)</i></p> <p><i>B) Blok B – 15 Tingkat Pangsapuri service Di Atas Podium (236 Unit)</i></p> <p><i>C) Blok C – 21 Tingkat Soho Di Atas Podium (320 Unit)</i></p> <p><i>D) 4 Unit Kedai Pejabat 4Tingkat Dan 8 Unit Kedai Pejabat 3 Tingkat</i></p> <p><i>E) Kemudahan Surau, Pejabat Pengurusan, Gymnasium, Kafetaria Dewan Serbaguna, Dobi, Sky Lounge, Taska, Kedai, Kolam Renang Dewasa dan Kanak-Kanak</i></p> <p><i>F) 1 Unit Pencawang Elektrik</i></p> <p><i>G) 7 Tingkat Podium Tempat Letak Kereta Di Atas Lot 63944, Persiaran Pinggiran Putra, Seksyen 2 Bandar Putra Permai, Mukim Petaling Selangor Darul</i></p>	JASMURNI CONSTRUCTION SDN BHD	<p>RM 139,701,004.05</p> <p><b>Duration Project :-</b>  (30 December 2015 – 10 June 2016)</p>

	<i>Ehsan Untuk Kensington Vision Sdn Bhd.</i>	
	(Zeva Apartment)	

**Table 2.3** List of Project in Progress

NO	TITLE OF PROJECTS	CONTRACTOR	COST PROJECT
01.	<p><i>Cadangan Pembangunan Pangsapuri Yang Mengandungi :-</i></p> <p style="padding-left: 40px;"><i>1) Blok A - 26 Tingkat (246 Unit)</i></p> <p style="padding-left: 40px;"><i>2) Blok B - 26 Tingkat (246 Unit)</i></p> <p><i>Di Atas 6 Tingkat Podium Tempat Letak Kereta Serta Kemudahan Penduduk Dan Pencawang Elektrik Di Atas Lot 1982, Mukim Petaling, Daerah Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur Untuk MESSRS.LUXURY CONCORD SDN BHD.</i></p> <p>(Trinity Aquata Condominium)</p>	<p>TRINITY INFRA &amp; BUILDINGS CONTRACTOR SDN BHD</p>	<p>RM 127,962,527.50</p> <p><b>Duration Project :-</b> (19 October 2018 – December 2019)</p>
02.	<p><i>Cadangan Pembangunan Satu Blok Pangsapuri 33 Tingkat (583 Unit) Dengan 8 Tingkat Podium Tempat Letak Kereta Dan Kemudahan Penduduk Di Atas Lot PT 80849 (Lot</i></p>	<p>TRINITY INFRA &amp; BUILDINGS CONTRACTOR SDN BHD</p>	<p>RM 145,131,352.80</p> <p><b>Duration Project :-</b> (Target Competition</p>

	<p><i>Asal PT 26744 &amp; PT 26745), Jalan Kuang Bertam 6, Taman Kepong, Mukim Batu, Daerah Kuala Lumpur Untuk Tetuan Darul Dinasti Sdn Bhd.</i></p> <p>(Trinity Lemanja Condominium)</p>		September 2021)
03.	<p><i>Cadangan Pembangunan Yang Mengandungi :-</i></p> <p><i>A) 1 Blok Kondominium - 34 Tingkat (330 Unit)</i></p> <p><i>B) 7 Tingkat Tempat Letak Kerata Termasuk 2 Tingkat Bawah Tanah Dan 5 Tingkat Podium</i></p> <p><i>C) 1 Tingkat Kemudahan Penduduk Dan Pencawang Elektrik</i></p> <p><i>Di Atas Lot 80664 (PT 25919) Dan Lot 80663 (PT 25943) Jalan Kiara 5, Mukim Batu, Daerah Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur.</i></p> <p>(Trinity Pentamont Condominium)</p>	<p>CHOICE APPROACH</p> <p>SDN BHD</p>	<p>RM 189,292,410.00</p> <p><b>Duration Project :-</b> (Target Completion 2023)</p>

## CHAPTER 3.0

### CASE STUDY

#### 3.1 Introduction

Trinity Group Sdn Bhd has proposed to build a Condominium Trinity Pentamont that will be located at Mont Kiara, Kuala Lumpur to created some of the most acclaimed developments, by pushing boundaries and setting benchmarks that improve a community's standards of living. Other than that, living up to mantra of "Building Communities & Enriching Lives", Trinity also emphasize to build more than simply places to live which is thoughtfully designed spaces where lives are enriched. Total gross development value is RM 189,292,410.00.

This project was started on 12 April 2018 until 11 December 2019 for this substructure construction which is handle by Choice Approach Sdn Bhd. The progress of this project now between 10% to 15% that has been complete. Furthermore, the next step of super structure will be handle by different contractor which will be award to involved in this project.

Mr Tham Kok Teng is the project construction manager in Trinity Group Sdn Bhd who had more than 10 years working experience as professional director manager. Moreover, Mr Ho Chee Choong and Mr Ziri Hakimi, the senior clerk of works who will be handle and in charge all the works and projects at site and office management as well. Basically, both of them had their own work as they need to handle this project from the first day until the end of the project and they will be fully base at this site to monitor everything.












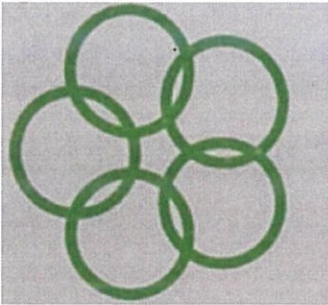
Figure 3.2 Project Signboard

Table 3.2 Project Information of the Signboard

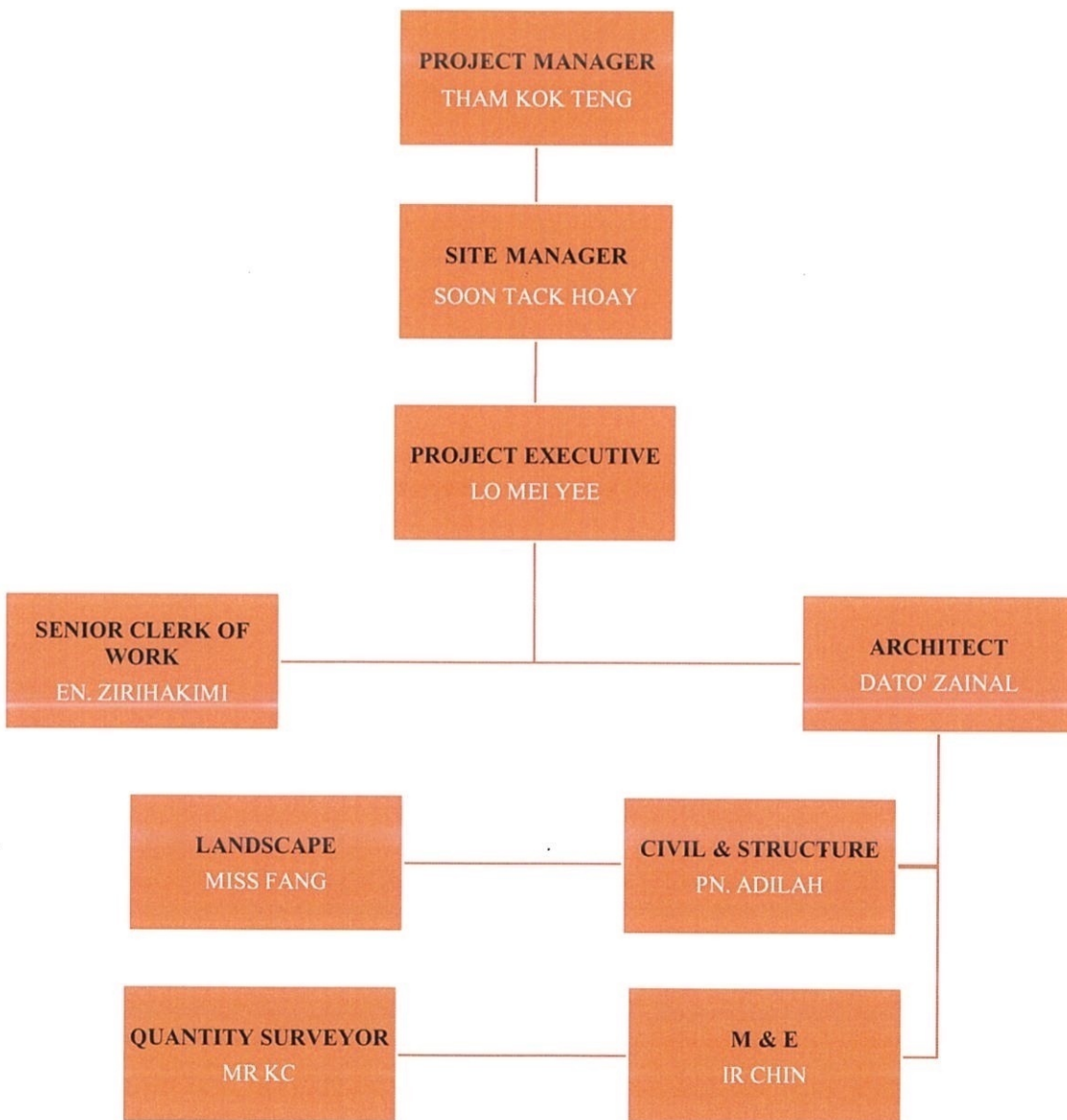
<p>Title of Project</p>	<p>Cadangan Pembangunan Yang Mengandungi :-</p> <p>A) 1 Blok Kondominium (330 Unit) 34 Tingkat</p> <p>B) 7 Tingkat Tempat Letak Kereta Termasuk 2 Tingkat Bawah Tanah Dan 5 Tingkat Podium</p> <p>C) 1 Tingkat Kemudahan Penduduk Dan Pencawang Elektrik</p> <p>Di Atas 80664 (PT 25919) Dan Lot 80663 (PT 25943), Jalan Kiara 5, Mukim Batu, Kuala Lumpur, Wilayah Persekutuan Untuk Tetuan Modern Pandora Sdn Bhd.</p>
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Majlis	Dewan Bandaraya Kuala Lumpur
Developer  	<b>MODERN PANDORA SDN BHD</b>  ZP-10, Zest Point, Lebuhraya Bukit Jalil, BK9, Bandar Kinrara, 47180 Puchong, Selangor.
Employer  	<b>TRINITY INFRA &amp; BUILDING CONTRACTOR SDN BHD</b>  ZP-10, Zest Point, Lebuhraya Bukit Jalil, BK9, Bandar Kinrara, 47180 Puchong, Selangor.
Architect  	<b>CL &amp; O ARCHITECT SDN BHD</b>  79-2, Blok G, Zenith Corporate Park, Jalan SS7/26, 47301 Petaling Jaya Selangor Darul Ehsan
C & S Engineer  	<b>EDP CONSULTING GROUP SDN BHD</b>  No. 24-1 (1 <sup>st</sup> Floor), Jalan USJ 10/1, 47620 Subang Jaya, Selangor Darul Ehsan,

<p>M &amp; E Engineer</p> 	<p><b>SM CONSULTING ENGINEERS SDN BHD</b></p> <p>Unit E-3A-3, Block E, Plaza Glomac, No. 6, Jalan SS7/19, Kelana Jaya, 47301 Petaling Jaya, Selangor Darul Ehsan.</p>
<p>Quantity Surveyor</p> 	<p><b>KOS CONSULT SDN BHD</b></p> <p>C-3a-6 Sunway Nexis, No. 1 Jalan PJU 5/1, Kota Damansara, 47810 Petaling Jaya, Selangor Darul Ehsan</p>
<p>Architect Landscape</p> 	<p><b>STUDIO THIRTY THREE DESIGN SDN BHD</b></p> <p>A-5-2, Jalan C180/1, Dataran C180, 43200 Batu 11, Cheras, Selangor</p>
<p>Contractor Sub-Structure</p> 	<p><b>CHOICE APPROACH SDN BHD</b></p> <p>No.3-10-B, Jalan Desa 2/2, Desa Aman Puri, 52100 Kepong, Selangor Darul Ehsan</p>

**SITE ORGANIZATION CHART**



**Figure 3.3** Site Organization Chart

### **3.3 Definition of Bored Pile.**

Bored piling is a method that involves boring a circular hole into the ground, installing the steel reinforcement and filling the bore hole with the concrete to form a proper pile. Boring also carried out the required depth by crawler crane mounted rotary boring unit or a purpose built hydraulic drilling machine. Furthermore, bored pile foundations are suitable for all types of soil conditions compared to conventional driven piling methods, this activities generate less vibration and noise at the same time.

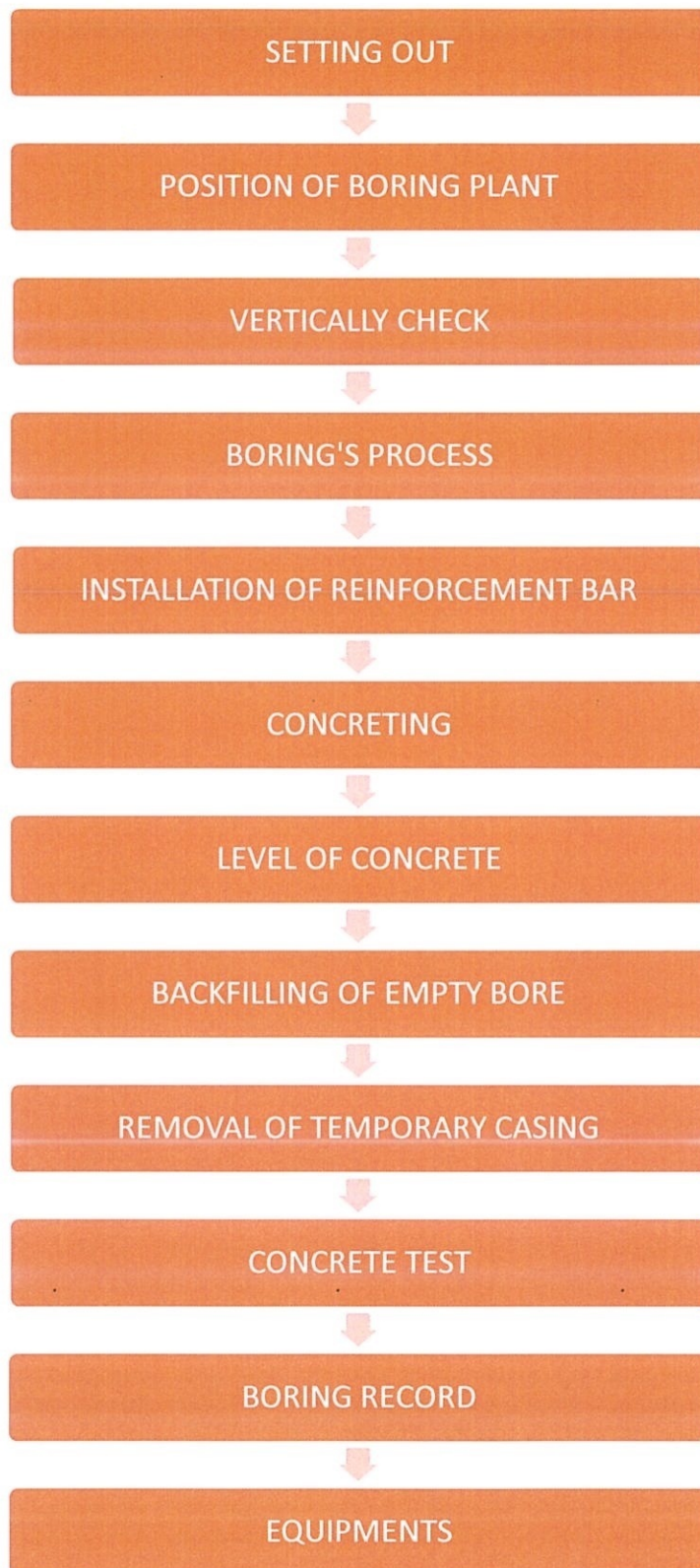
Moreover, bored piles also known as replacement piles that are commonly used form of building foundation that provide support structure, transferring the load to layers of rock or soil that have suitable settlement characteristics and sufficient bearing capacity.

Bored piles are popular in urban areas as there is minimal vibration, less risk of heave and need to vary the length of the piles. Hence, bored piles are used primarily in cohesive subsoils for the formation of friction piles and forming pile foundations when it close to existing buildings.

Besides, bored piles are constructed in the ground by boring in the circular shape of the design diameters to transfer the load from the superstructure into the ground through their friction and also end of bearing. The process of construct bored pile is showing in figure 3.2.



### 3.4 Flow Chart of Bored Piling Work Process



**Figure 3.4** Flow Cart of Bored Piling Work Process



### 3.5 Bored Piling Layout Plan

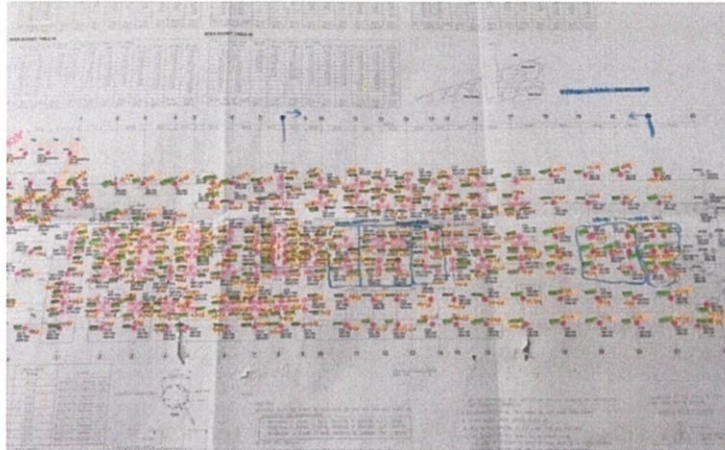


Figure 3.5 Piling Layout Plan

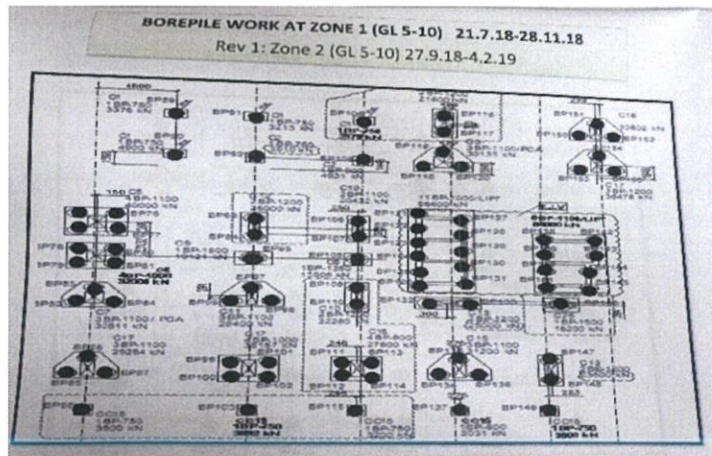


Figure 3.6 Plan of Bored Pile Work at Zone 1

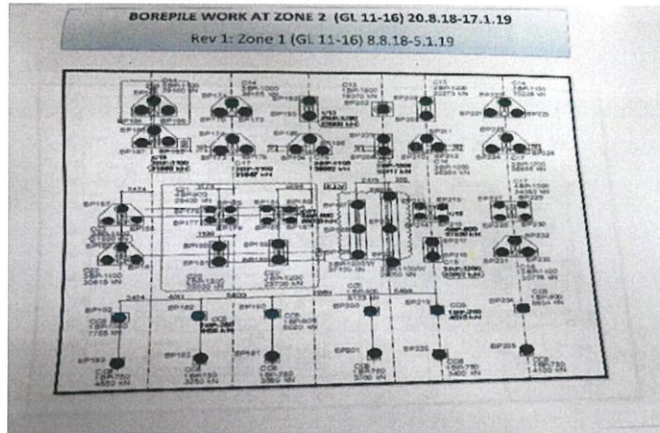


Figure 3.7 Plan of Bored Pile Work at Zone 2

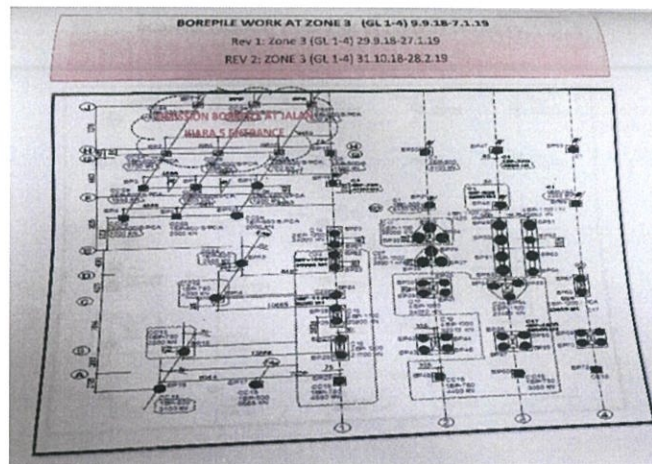
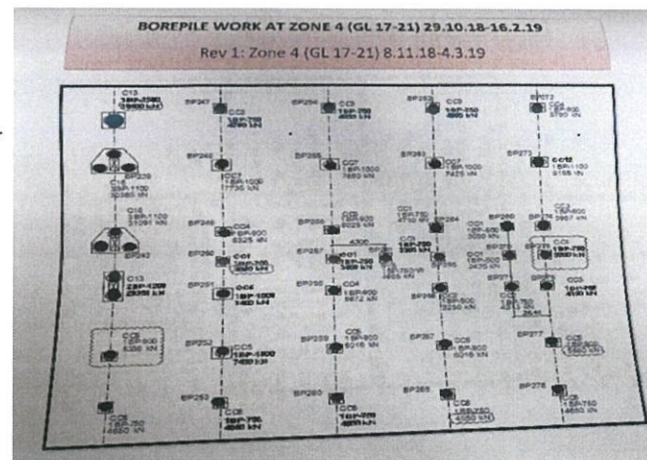


Figure 3.8 Plan of Bored Pile Work at Zone 3



## 3.6 Process of Bored Piling

### 3.6.1 Setting Out

1. Cloud Access Security Broker (CASB) shall engage a competent Licenses Surveyor to set out temporary and permanent reference markers along the construction site at convenient location. Thus, before boring operation commences, the piles position shall be set out and checked.
2. Then, off-set pegs need to be placed perpendicular to each other to re-check pile position to the supervision and approval of the Engineer's representative.



**Figure 3.10** Setting Out by Surveyor



### 3.6.2 Position of Boring Plant

The boring plant will be moved to the pile position intended for boring. After that, the Kelly bar of suitable auger is then placed just above the pile point. The vertically of the Kelly bar shall be checked by means of suitable and convenient instruments such as a spirit level. Hence, adjustment shall be made so as to enable the Kelly bar vertically to be within 2% of plumb for the total length of the shaft.

Moreover, when the position of the auger is checked against the pile point, adjustment shall be made so that the center of the auger is nearest to the pile point. Thus, the auger is then lowered slowly and boring operation commences prior to the observation and approval of the Engineer's representative.

Besides, if necessary a temporary casing of suitable size is inserted into the hole where boring to be carried out before inserting the position of the casing is then driver into the soil using a vibro hammer. Therefore, vertically the casing is checked using two plumb bobs suspended at a convenient distance perpendicular to each other



**Figure 3.11** Setting Auger's Drilling Machine at Position

### 3.6.3 Vertically Check

Next, vertically shall be checked by using a in-built vertical indicator on the Kelly bar. Furthermore, care shall be taken so that the pile position and the vertically of the pile care are constructed within tolerance given in the specifications.

PILING AND PILE TESTING KLANGAN PAHANG		PILE SIZE: 500 Ø	
PILE NO. 00 P	TYPE: spun pile (permanent)	Date Completed: 7/1/2019	
Specific Capacity 1620 kN	Date Driven: 7.7.2014		
ITEM	SPECIFICATION	ACTUAL	CHECKED BY
PILE SHOE	REQUIRED	YES	TIA
VERTICALITY	$\frac{2}{3}$	$\frac{1}{3}$ $\frac{1}{3} = 0.133$	TIA
HAMMER DROP (if applicable)		NO	TIA
SPLICING JOINT WIRE BRUSHING		YES	TIA
WELDING JOINT	Visual Inspection	GOOD	TIA
WELDING JOINT TESTING	If required		
SPLICE - PAINTING	If required	YES	TIA
FINAL SET		2.1 kN	TIA

Figure 3.12 Form of Vertically Check

### 3.6.4 Process Of Boring

1. Boring process is anticipated that all piles will require temporary casing, depending on the ground conditions. Then, the selection of technique will be based on a review of ground conditions at each location and identified in the site and pile specific method statement.
2. Meanwhile, the boring rig will be set up and levelled at the pile position and the vertically of the Kelly bar periodically be checked using the vertical indicator. Thereby, references pins will be set out from the pile center pin and used to check the position of the casing during its installation.
3. Furthermore, a prebore in which to pitch the temporary casing will be drilled and the depth of prebore will be determined by the piling foreman, but will not extend below a level at which a significant quantity of water is encountered or at which the bore becomes unstable.



4. Next, the casing will be cleaned out using augers and digging buckets as appropriate. Then, tool diameters also will generally be 25mm smaller than the nominal pile size and the temporary casing will be advanced into the ground to a depth of between six to nine meters to hit rock level. This is to ensure that the pile position and stability of the earth at the upper level is maintained.
5. Moreover, when the rock is encountered, the bore will be probed to establish the inclination of the rock head by dipping with a tape attached to the Kelly bar at the four pile quadrants. If the ground conditions vary from G.I data, further advice will be sought using the Final Random Inspection (FRI) procedure.
6. The rock socket will be excavated using augers, buckets, rock augers, core barrels, chisel and grabs as appropriate. Next, the drilling will be recorded for depth and times, type of tools being used and the description of rock. Thus, samples will be taken approximately 1.5m intervals and the strata changes for future reference. Each sample will be marked with pile number and depth and kept on site until the pile is completed.
7. However, the toe of the pile will be cleaned using a cleaning bucket and to be verified by the Engineer's representative upon boring completion. This pile base bucket need to be cleaned as the satisfaction of the Engineer's representative. But for wet piles it will remain at the toe for approximately 15 minutes to collect any settlement. Then the toe will when be probed to check either its profile is flat and the pile base also need to be checked by lowering a measuring tape that attached to the steel bar at least 3 distinct points of the bore pile to verify base cleanliness. If this is necessary, it will be flattened by use of a core barrel or chisel and the cleaning operation need to be repeated. Meanwhile, dry piles will be visually inspected from the surface to be verified by the Engineer's representative.



**Figure 3.13** Drilling's Process

### **3.6.5 Installation of Reinforcement Bar**

1. Firstly, the reinforcement of the bored piles will be prefabricated in the reinforcement yard on the site and shifted to the bore hole for placing. After fabrication of the reinforcement by the competent bar tender, the helical links will be bind to the main reinforcement using wires and tack welding. Hence, stiffener to be added at every 3m interval and it will take necessary precaution to ensure no ovalling of reinforcement cage during fabrication process. After that, the reinforcement shall be free from dirt, dust, mud and other material.
2. Secondly, 50mm to 100mm diameter round concrete spacers will be tied to the main reinforcement to provide the required cover to the main reinforcement against the soil during concreting. All reinforcement used in the construction of pile shall conform to the specification and construction drawings. Next, reinforcement details need to be noted in a Request For Work Inspection (RFWI) form to be verified by the Engineer's representative.

3. Moreover, reinforcement cages shall be sufficiently long to ensure that they remain at their correct level during the placing of concrete and during removal of temporary lining tube or casings using a vibro hammer.
4. Finally, the prefabricated cage shall be lowered down into the bore hole by lifting the entire cage using a suitable crane. Hence, the top of the cage will be welded with suitable hook for lifting of the cage shall lapping of reinforcement is needed of a lap length of  $40D$  shall be used. The laps shall be done using welding or tied with tie wires. Repeat the step above until required depth is reached.



**Figure 3.14** Reinforcement Bar



**Figure 3.15**

Installation of bored pile rebar by using mobile crane





**Figure 3.16**

Installation of Reinforcement Bar into borehole



**Figure 3.17** Position Reinforcement Bar using j-hook

### 3.6.6 Process of Concreting

1. For wet piles in concreting work, full length tremie tube of 250mm internal diameter will be used and it will be of smooth internal section with water tight joints. Hence, the tremie tube will extend until the 'U'-bar at the bottom end just touches the pile toe.
2. Secondly, the concreting operation will be overseen by the piling supervisor. Each load of ready mixed concrete will be slump tested prior to being discharged into the works to the satisfaction of the Engineer's representative. Thus, the result of the test will be recorded and any load with a slump outside the acceptable range will be rejected. This samples from slump test for future concrete test to be kept in a dry and suitable area.
3. Then, concreting pile will be checked for the depth to ensure no settlement or collapse has accumulated at the pile toe immediately. During concrete placing, the tremie tube will be kept immersed at least 3m at all times as the concrete risers by removing the uppermost section of the tube with the service crane.
4. Besides, concrete will be placed in a continuous operation. A detailed record of the operation will be kept by a supervisor who will be in full time attendance during the concreting. Next, concreting will continue until clean concrete is flushed over the top of the temporary casing. The tremie will then be moved as the concrete is considered to be self-compacting and vibrators will not be used.
5. Furthermore, during the extraction of the temporary casing, the casing to be extracted within 2 hours after concreting works complete and the concrete level within the casing will be maintained at or above ground level. The level of this concrete will be checked visually or by striking the casing with a hammer. A distinct difference in tone can be identified hence the concrete level can be monitored throughout casing extraction. Additional concrete will be added as required.
6. A reserve supply of concrete will be on hold at the batching plant in case of large concrete loss during casing extraction. The casing may need to slightly re-driven whilst awaiting additional concrete delivery in order to prevent the loss of concrete.
7. As a result, this should be suitable for ground conditions to enable the piles to be bored and concreted dry. Then piles will be concreted by 6m length 250mm diameter tremie tube hopper. Hence, all concrete testing and recording procedures stated above are apply.





**Figure 3.18**

Installation tremie pipe and hopper

### **3.6.7 Level of concrete**

In level of concrete, concrete shall be taken to at least 500mm above the theoretical cut off level to ensure that all concrete at and below cut off level be homogeneous and free of laitance and deleterious matter.

### **3.6.8 Backfilling of Empty Bore**

Where the trimmed level of any pile is more than 300mm below ground level, the empty bored holes shall be backfilled with suitable bored material within 24 hours after the concrete has set.



**Figure 3.19**

Backfilling concrete of Bored Pile

### 3.6.9 Removal of Temporary Casing

The depth of the average levels of the concrete surface in the casing shall be checked before and after the temporary casing used is withdrawn to ensure the cut off level.



**Figure 3.20** Remove of Temporary Casing

### 3.6.10 Concreting Testing

Stringent control of the mixing of the concrete shall be exercised by the supplier and cube strength test shall be carried out in accordance to BS 1881. A set of 3 number of 150mm x 150mm x 150mm cubes shall be taken for each 20m<sup>3</sup> of concrete cast or as required by specification or as Engineer's director. One cube shall be tested at three days, one cube shall be tested at seven days and one cube shall be tested at twenty-eight days after casting. Moreover, concrete shall be taken to at least 500mm above the theoretical cut off level to ensure that all concrete at and below cut off level be homogeneous and free of laitance and deleterious matter.



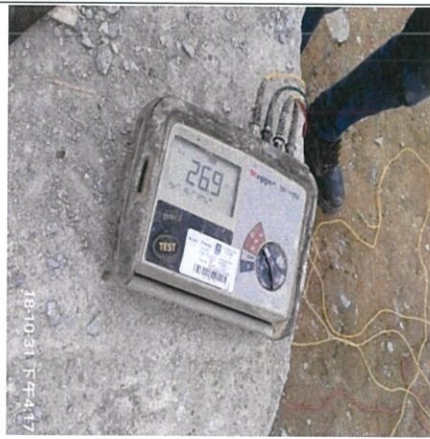
Maintain Load Test (MLT)



Pile Driving Analyzer Test (PDA TEST)



Pit Integrity Test (PIT)



Sonic Logging Test Pile

**Figure 3.21** Concrete Test



### 3.6.11 Boring Record

Records pertaining to the bore logs as well as other details required are recorded very accurately using the recording forms attached.

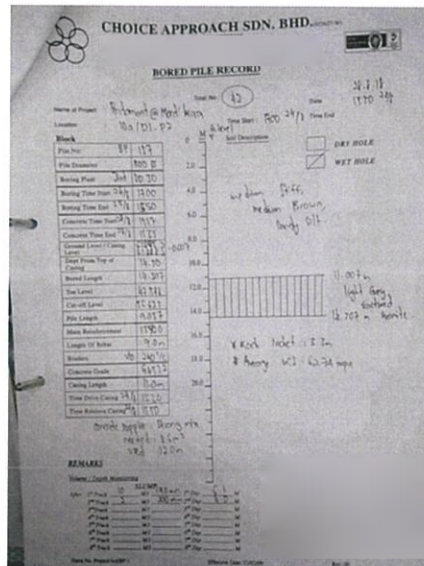


Figure 3.22 Boring Pile Record

### 3.6.12 Equipments & Accessories

The following machinery and accessories shall be used for the bored piling operations:-

- |   |                  |
|---|------------------|
| 1. Boring Rigs                            | - 2 rigs         |
| 2. Service Cranes                         | - 1 nos          |
| 3. Vibro Hammer                           | - 1 complete set |
| 4. Hydraulic Excavator                    | - 2 nos          |
| 5. Welding Sets                           | - 2 nos          |
| 6. Auger, Boring Buckets Cleaning Buckets | - Various sizes  |
| 7. Coring Buckets, Chisels                | - Various sizes  |

### 3.7 Issues on the Construction of Bored Pile

During construction of this project, there are a lot of issue and problems occur. One of the problems is limited time to run all the machineries to construct bored pile. This issue happened due to the no compromise between neighborhood that stay around there as they dislike any distraction noise even during working hour. After inspection and discuss with local authority (Jabatan Ketua & Keselamatan Kampung) in that area, the project manager come out with the new solution on how to reduce distraction noise during operating the machinery such as drilling by pour some water.

Furthermore, another problem at the site is restricted access gate for the lorry at construction site. This problem occurs because it has very limited space at the construction site especially for the main access door. Therefore, the problem could affect other issue during delivered concrete because need to queues before access the construction site. Thus, this problem contributed to the delays in construction projects because of the late arriving supplies for construction work.

Other than that, the main objective of this report is to identify the causes of delays in construction time and to study the solutions use by the contractor to overcome this problems. Project management should have the skill to solve and stipulate the production schedule in the construction contract which they can use to monitor the progress of the project. However, if the delays occur, it should be addressed quickly communication by the contractor immediately. Thus, the result of this problems is aimed to help the contractor identify the issue of delays in construction and the solution use by the contractor for managing the problems.

Other of problem that occur at the site is lack of communication. This problem happened due to huge number of foreign workers that working on construction site. Hence, the problem related to the employment of foreign workers are numerous. This problem could contribute to the risk of accidents among workers at the site due to misunderstanding during received an instructions.



## CHAPTER 4.0

### 4.1 Conclusion

In conclusion, bored pile is one of the Substructure element of a building that supporting the load of building from the ground. This includes foundations and basement retaining walls. The lowest artificially built part of a structure which transmits the load of the structure to the soil lying underneath. During the internship, the student was exposed to the real situation at the construction site. The process of bored pile is not easy to construct. This is because there are a lot of obstacle, issues or problem happened during construct bored pile. To avoid the problem occur in future, the process of work must be arrange accordingly based on the instruction given.

The report is focusing on the issues occur in the construction of bored pile. The workers should alert and followed all the instruction that have been given to prevent from any accidents or injury during working. This issues happened due to huge number of foreign workers working at the construction site due to the minimum salary among that given to the foreign workers compare to local. Other than that, this will affect the process of bored pile if the workers could not followed or listened to the instruction given properly.

Hence, the management should hire a qualification workers in construction to prevent from any incidents happened. This situation could be risk in future if the management never take this seriously. This problem could affect the company reputation and it against the law that already stated in construction. The management should priority the safety of the workers in construction site and take action to have a better working process in future.

## **4.2 Recommendation**

Firstly, throughout this industrial training, there are several recommendations were made to increase the effectiveness and efficiency to understand the concept and gain the participation of the student in the industrial training to be more exposure rather than recommendation for the project where the information in this report were taken.

Thus, management department at any construction project should give a brief description at the beginning of the day before working hour start to ensure all workers understand their duty and task as to avoid wastage of timer among worker in guidance at every hour besides to avoid repeating work due to the careless of workers at site that cause losses and damage because of the mistakes.

Finally, for stability of the management in handling substructure, the workers should know how to do all the duties perfectly as the workers should follow all the instruction given and schedules that have been prepared to ensure that there is no defect occur. Hence, the surveyor need to be more alert during monitoring as to avoid that kind of situation.

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