DEPARTMENT OF BUILDING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

PILING WORK, CONSTRUCTION OF FOUNDATION AND ANCILLARY WORK

Prepared by:

Muhammad Haikal Bin Mohd Noor

2019210146

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

AUGUST 2021

By

Muhammad Haikal Bin Mohd Noor

2019210146

entitled

Piling work, construction of foundation and acrylic work

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

Report Supervisor	:	SR Anas Zafirol Bin Abdullah Halim
Practical Training Coordinator	:	Dr. Nor Asma Hafizah Bt. Hadzaman
Programme Coordinator	:	Dr. Dzulkarnaen Bin Ismail

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

10 JANUARY 2022

STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during a practical training session that I underwent at Turcomp Engineering Services Sdn. Bhd. for duration of 20 weeks starting from 24 August 2021 and ended on 7 January 2021. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

…….

Name : Muhammad Haikal bin Mohd Noor

UiTM ID No : 2019210146

Date : 10 January 2022

ACKNOWLEDGEMENT

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

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 Mr Yap May Leong for the opportunity given, to conduct my training in his esteem company. His team of professionals comprising of En Ronnie Bin Nualin, En Wan Mohd Syamzri Bin Wan Nawang, En Mazlan Bin Mohamad Jam, and have enabled me to learn and develop my understanding, knowledge and feel of real time projects, and the theory involved in analysis of structures, building and civil works. They are also responsible towards streamlining and assessing my training. Also, to the site personnel in both Tenaga Nasional Berhad and Mahkota Technologies Sdn. Bhd. who have 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 honor 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 Cik Nor Azizah Binti Talkis, practical training coordinator, SR Anas Zafirol Bin Abdullah Halim, Report Supervisor and I value the time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and the valuable knowledge that 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

The piling work, construction of foundation and ancillary work during this report is relevant because in the construction process there is this work. The explanation for this work has is about what to do in the piling activity, what should do after the piling work, how to conduct the piling, also after the construction foundation. The data used on the report can get by using interview method, from the method statement and from the internet search. in relation to what is often done, in the field of construction should follow the spec set by the client and rely on the law that UBBL 1984 is a building code which provides the minimum requirements for the control and construction of street, drainage and building in local authorities' areas.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1.0

1.1 INTRODUCTION

Piling is accomplished by putting enormous pieces of wood, steel, or concrete into the ground's soil. The deep insertion of these pieces gives a more stable foundation for the construction project.

Imagine if your office building didn't have a structural foundation beneath it wouldn’t last long! People don't always realise how much effort goes into building, but any contractor will tell you that there's a lot of planning, measurement, and hard labour involved. Piling is not a method that we can all master in a few hours; it is a highly skilled task that is extremely necessary. You must ensure that the foundation is stable and that the piling is done appropriately so that the structure is as solid as a rock.

The foundation is the lowest portion of a building or civil construction that is directly in touch with the earth and securely distributes weight from the structure to the soil. In general, foundations are divided into two types; shallow foundations and deep foundations. A shallow foundation transmits the weight to a shallow-depth stratum. The weight is transferred to a deeper depth below the ground surface by the deep foundation. A tall building, such as a skyscraper, or one built on particularly unstable terrain need a deep foundation. If the structure is intended to be extended vertically in the future, a deep foundation should be recommended.

Trenches are dug deeper into the earth until a hard stratum is reached in order to build a foundation. Concrete is poured into this ditch to strengthen the foundation. These ditches are reinforced with a cage to strengthen the foundation's strength. The outwardly projecting steel rods serve as the bones and must be attached to the foundation above. After the foundation has been properly filled, the building's construction may begin. The foundation can be built using concrete, steel, stones, bricks, and other materials. The material and kind of foundation used for the intended structure are determined by the design loads and the underlying soil. The foundation's design must account for the many environmental implications of development.

1.2 Background of Study

Based on the case study, the project was carried out in the practical training is project construction and completion of one unit of new PMU 132/33kV, on lot 45371, Danga Bay, Bandar dan Daerah Johor Bahru, 81200 Johor Bahru, Johor Darul Takzim behind Grand Straits View Garden Seafood Restaurant.

Total amount of construction and completion of one unit of new PMU 132/33kV, on lot 45371, Danga Bay, Johor is RM 30 860 380.00 (thirty million eight hundred sixty thousand three hundred and eighty) . Contract period for this project is 600 days starting from 20st September 2019 and the target to complete is on 31st March 2022 depend on percentage of project.

In the construction project, there are parties involved directly and responsible for the completion of this project. Between the parties involved in the construction and completion of one unit of new PMU 132/32KV is Perunding ZE as consultant, Mahkota Techonologies SDN. BHD. as a main contractor, Turcomp Engineering SDN. BHD. as a sub-contractor and Tenaga Nasional Berhad as a client for this project.

1.3 Objectives

II. To identify about piling work
III. To identify the construction of foundation
IV. To identify the machinery and equipment used for construction of foundation.

1.4 Scope of Study

The scope of study only focused on piling work, construction of foundation, machinery and tools used to do a piling work and construction of foundation for Tenaga Nasional Berhad, that is the owner of new PMU 132/33kV that located lot 45371, Danga Bay, Bandar dan Daerah Johor Bahru, 81200 Johor Bahru, Johor Darul Takzim and

1.5 Methods of Study.

There are two methods of study were used in obtain information for this report. The method is primary and secondary. Primary sources are materials that have not been processed or printed the resources or materials that are still in original condition. These resources are original and not interpreted. Primary sources are divided into observations and interviews method.

i. Observation method

This observation method is done directly that is with site visits. This observation is also supported by the used of camera. This camera is used to take pictures at the project site for more information on a project for example, a photo of the machine and the progress of the construction site.

ii. Interview method

Other methods that can be used to obtain information for this report is interview. Interview was conducted to obtain more detailed information about the project. This method is done with interview someone who is experienced or involved in the project for example, interviewing engineers, site supervisors, contractors and project manager.

The secondary source of the latter is made up of materials or documents reviewed by reading written material. These sources include magazines, journals, newspapers, newsletters, and blogs. The second source is the material that has been processed, printed and disseminated to the public. In this project, for secondary sources to obtain information by making reference such as referring books, magazines, blogs, internet and any references related to the construction industry. Besides that, for other information may refer the drawing or document.

i. Journal

Journal is one of the reading materials prepared from a person create. There is a lot of information that can be obtained from the use of journal. Journal are usually done for an individual work, and sometimes a small group.

ii. Books

In this project, the book has been used as a secondary source to get more information about the construction of foundation. There are several books that have been used to obtain information. These books are available from the internet, the use of the websites google books

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of Company

Turcomp Engineering Services Sdn Bhd, a Bumiputra status company, was established in year 1992 in Labuan. The company name, Turcomp denotes TURbine & COMPressor, which was the initial business, specialised in providing maintenance services of rotating equipment for the process and power plants in the vicinity of Labuan. Since then, Turcomp has evolved to become an integrated services and solution provider, today Turcomp has 15 offices, 9 workshops and 5 warehouses across major cities in Malaysia.

2.2 Company Profile

RESPONSIBILITIES

Turcomp strives to be the major vendor and service provider in the Oil & Gas and Energy industry. With a team of professionals, engineers & technical staffs, Turcomp offers in-depth expertise in products and sourcing, engineering contracting and technical services for the Oil & Gas and Power Industry throughout Malaysia

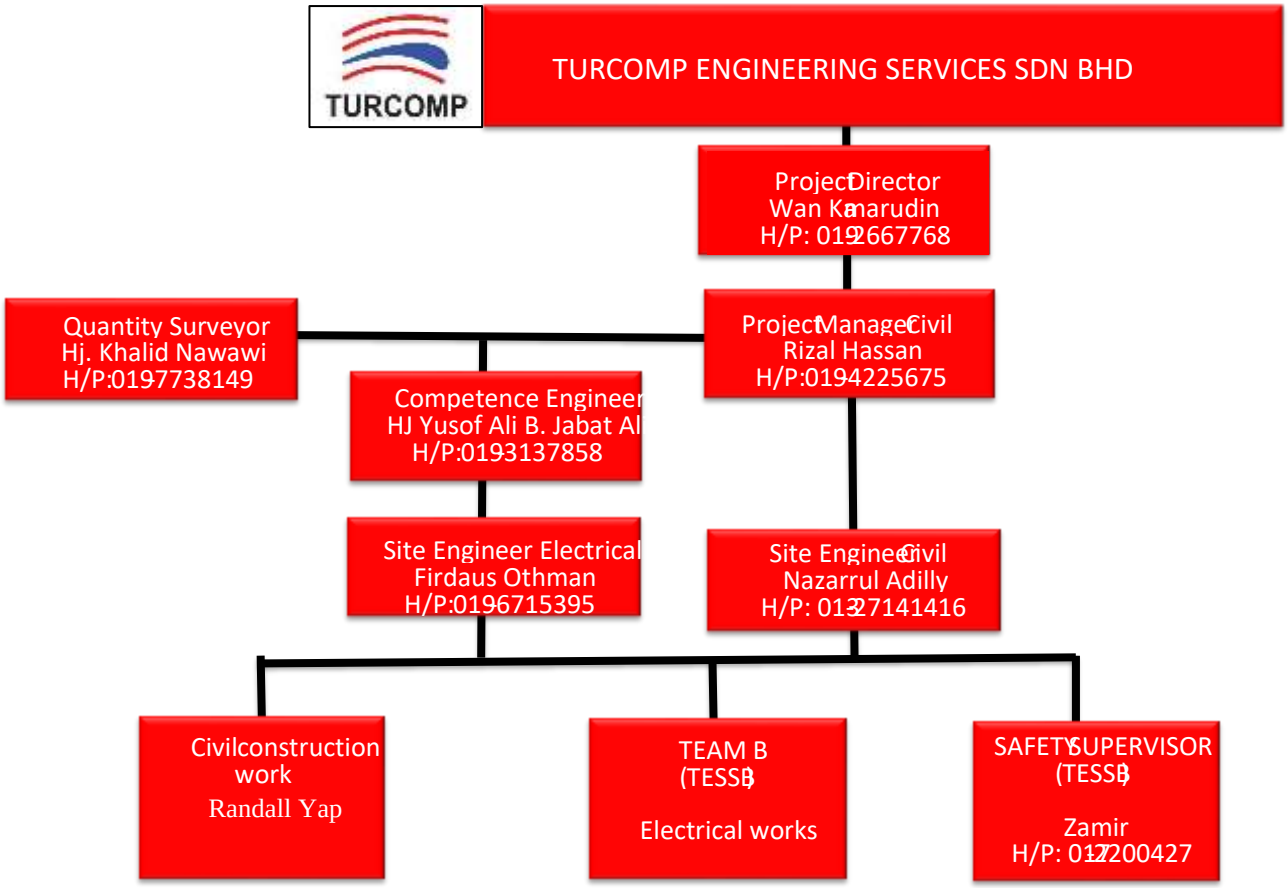
MISSION

“To be a high performance services and solutions provider,embracing client’s requirements by delivering cost-effective, reliable and high quality services and solutions, while nurturing an enriching, fulfilling and rewarding environment for our employees.”- Turcompians

CORE BUSINESS

1. Plant Turnaround and Maintenance Services
2. Industrial Equipment and Automation Solution

2.3 Company Organisation Chart



Page 1 of 1

2.4 List of Projects

TURCOMP

TURCOMP ENGINEERING SERVICES SDN BHD
LIST OF JOB NUMBER

MELAKA/PONTIAN		
1	CJ059	TIOMAN FLOW METER
2	CJ127	PD JETTY
3	CJ131	FIRE ALARM SYSTEM
4	CJ160	PD STORE
5	CJ200	MHS TERENGGANU
6	CJ222	FIRE SPRINKLER STIC TJPS
7	CJ273	PMU MCCA
8	CJ284	AIRLIFT PD
9	KJ310	MHS BOMBALAI
10	CJ302	PMU AYER KEROH
11	CJ325	RUBBER LINING PD - NOT PS
12	CJ338	DOSING SYSTEM PD 1
13	CJ340	FLOW METER ISLAND
14	CJ348	JIMAH EAST MARQUEE TENT
15	CJ367	JIMAH EAST CHIMNEY INSPECTION
16	CJ374	SJTJ CHINMEY INSPECTION
17	TCA161	ROUTINE PMU SZBAN - PACKAGE B
18	JJ1607	SWTP EXTERNAL
19	JJ1608	REHAB RBI
20	JJ1680	MANPOWER
21	JJ1695	SCUM BOOM REPLACEMENT
	KJ374	Bank Rakyat Renau
	KJ330	Bank Rakyat Putrajaya
	KJ381	" Likas
	CJ413	Tioman Flow meter

PUCHONG		
1	LJ661	AMBIENT CONTAINER
2	LJ665	SWAP MOTOR PAF 4B-4A BASE
3	LJ666	ECP BOOSTER PUMP FOUNDATION
4	LJ667	BOILER ENGINEERING WORKSHOP
5	LJ668	AWNING & WATERPROOFING AT RC BUILDING
6	LJ670	3 UNITS QUARTERS FOR RC
7	LJ675	PMU DAMANSARA
8	LJ679	REFURBISHED SWITCHGEAR ROOM
9	LJ685	CABIN WORKSHOP GF3
10	LJ697	MHS KELANTAN
11	LJ715	2 UNITS EFFLUENT PUMP FOUNDATION
12	LJ761	NEW GUARDHOUSE, GF3
13	LJ826	PMU PBJB & LARKIN
14	LJ828	PMU KPDN KL
15	LJ839	CONSTRUCT GENSET AREA, JERANTUT
16	LJ876	CHIPPING STONE - KUALA NERANG /A.SETAR
17	LJ877	CHIPPING STONE - SIK, KEDAH [illegible]
18	LJ930	PPU ELMINA
19	LJ943	CHIPPING STONE - JITRA, KEDAH [illegible]

SUNGAI PETANI		
1	TJ026	132KV MAIN INTAKE S/S ROOF MODIFICATION
2	TJ037	SCHEDULE WASTE STORE TNB PRAI
3	TJ038	2 MINI HYDRO STATION IN KEDAH
4	TJ055	MHS TAWAR BESAR
5	TJ066	PENSTOCK CRACK REPAIR SJ TEMENGGOR
6	TJ072	PMU BKT BERUNTUNG
7	TJ088	HDVC GURUN
8	TJ089	PMU TEWA & PMU TELUK APAU
9	TJ090	PMU KOTA SARANG SEMUT
10	TJ091	BAIKPULIH PAGAR DI PMU GURUN EAST
11	TJ092	TELOK APAU BUMBUNG 3K - NOT PS
12	TJ093	TANK GELUGOR
13	TJ094	PMU PLENTONG
14	TJ097	PPU JENIANG
15	TJ099	PMU SEBERANG JERTEH
16	TJ100	PMU BAONG
17	TJ103	NRW UUM
18	TJ104	NRW LABUAN
19	TCA16/34	SCAFFLODING NUR KULIM - COVER JOB
20	TCA16/53	UNDERWATER WORK INSPECTION
21	TJ105	PMU [illegible]
22	TJ112	SSL PULAU AMAN

SG TIRAM, JB		

KEMAMAN		
1	ZJ95	MHS TERSAT
2	ZJ241	PPU TANAH MERAH
3	TCA99	OFFICE KUALA BERANG

KUANTAN		

CHAPTER 3.0

3.0 CASE STUDY

3.0.1 Introduction to Case Study

This study describes the whole method to construct a piling work, construction of foundation and other acrylic work. In Malaysia, there are many shapes and type of foundation, but in this case, study only focused on the ways of construction a pile cap, that located on lot 45371, Danga Bay, Bandar dan Daerah Johor Bahru, 81200 Johor Bahru, Johor Darul Takzim behind Grand Straits View Garden Seafood Restaurant. for a new PMU to supply power to surrounding area. In addition, this study also focuses on the piling and foundation used to construct a new building and also describes the conclusions and recommendations of the construction a new PMU.

The new PMU function is to supply electric to surrounding area of Johor Bahru and near the village around it. Maximum allowable capacity of DG is 85 % of PMU transformer trough load. For solar PV, the maximum allowable capacity is 85 % of PMU transformer trough load during daytime. In cases where multiple sources of generations are produced and owned within a common site, multiple-feed configuration is allowed to optimize the number of interconnection feeders at PMU.

3.1 PILING WORK

3.1.1 General Works

I. Hydraulic pilling machine will be delivered by using 2 lorry cranes to the site

   (i) Piling Machine body

   (ii) Counterweight, power pack, chamber.

II. Material of pile will be delivered using 40ft lorry crane. The pile will be unloaded at site using lorry crane.

III. The route of the delivery as per route in layout plan. From main gate it will move to piling storage area.

IV. The piling rig (body only) will unload from the lorry crane using its both long and short slipper on to the road. Then, move onto the side table before installation of its counterweight, chamber and power pack using mobile crane.

V. The area to accommodate the Hydraulic machine needs to be relatively flat. The RC pile will be placed near vicinity of the machine to facilitate assembly of the RC pile.

VI. Hook the pile at two points and using approve steel chain during pile unloading.

VII. The pile has to be place on the firm/flat ground and using hard timber as support to stack pile. Refer to **Figure 1.**

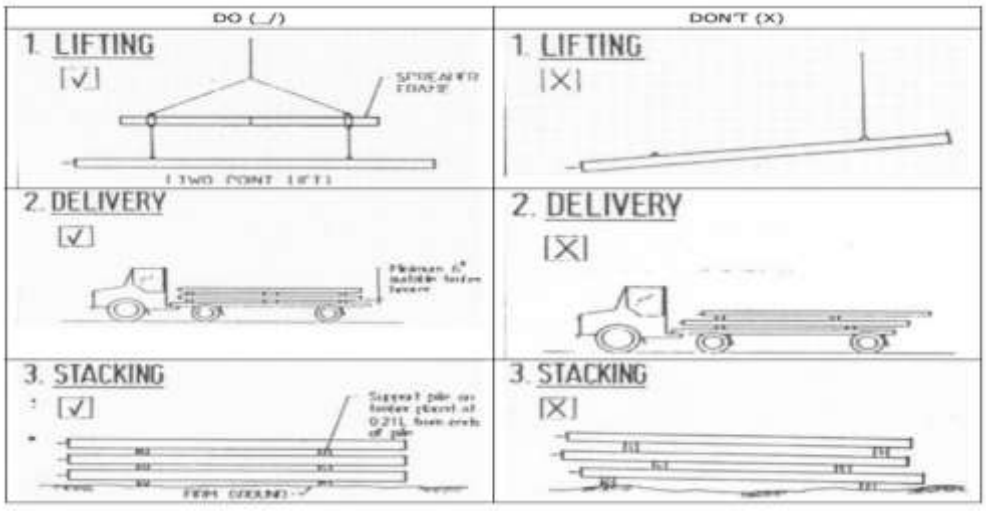


Figure 1: RC Pile handling procedure

3.1.2 Piling Works

I. Location of RC square pile shall be place at proposed storage area which is within the operating radius of the jack-in piling machine.

II. Before commencement of work contractor need to ensured that: -

a. A pile layout drawing and specification relating to contract are available

b. Client has been made aware of our intention to commence piling.

III. The piling rig (body only) will unload itself from the lorry crane using its both long and short slipper on to the road. Then itself will move onto the proposed assemble area.

IV. Counterweight, power pack and chamber will be installed using 20-ton mobile crane.

V. The height of the machine is about 7.65 m. The operator will operate the machine and shifted it to next location if needed.

VI. The vertical support structure of the jack-in machine is plumbed to ensure vertically by means of spirit level or plumb line. This is achieved by adjusting the four stabilizers.

VII. Each pile shall be clearly marked with red ink at 500mm intervals along its length to enable jacking pressure/force to be recorded at every 500mm depth of pile penetration.

VIII. Insert pile into the Jacking system clamp by using on-board winch. All handling and lifting will be at the designed lifting points and support points.

Figure 2: pilling machine

IX. The pile is then slot into the pile hat using the winch. Safety bar is then closed as to avoid the pile from falling onto the piling rig.

X. Final vertical check and commence jacking pile by applying force onto the pile hat to press down the pile.

XI. After inserting the pile at least ½ of the pile length, the pressure on the pile hat will be gradually released to unhook winch.

XII. Piling will commence using the Jack-in machine, new RC pile will be inserted every 6m depth.

XIII. This process will continue until maximum depth of 24m or hard soil strata encountered as required.

XIV. During the pile installation, the hydraulic pressure of main jacks is measured by the building pressure gauge, and the corresponding pile penetrations are recorded by site operator at regular intervals.

XV. Once the required pressure correspond to the required jacking force is indicated in the pressure gauge, the pressure is held for 15 seconds.

XVI. The pile considers to be “Set” when it can withstand 2 times the pile working load and maintained for 15 seconds with residual settlement not more than 6mm for at least 3 consecutive times. As shown in Figure 2.

XVII. The pile will be extended by butt-welding the steel plate on the pile heads. On completion of welding the slag will be chipped off and wife brushed to receive bitumen or anti rust paint.

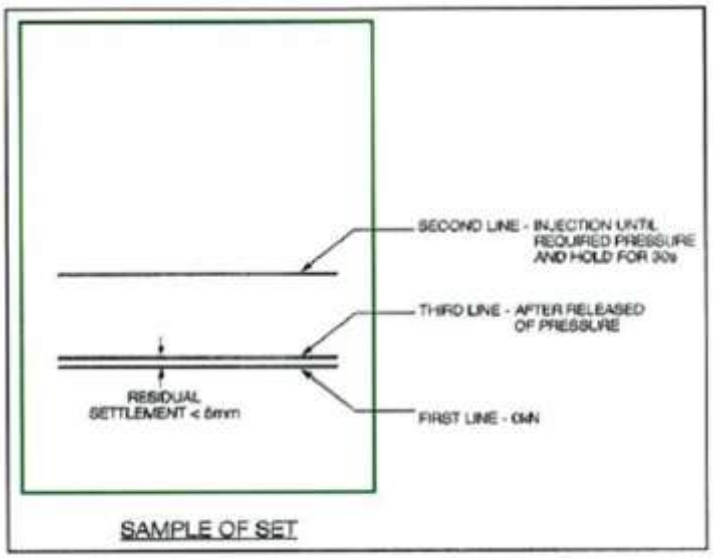


Figure 3: sample of set

XVIII. The correct vertically of the pile position relative to the reference pins shall be checked using spirit level.

XIX. Upon completion of pile installation, the protruding pile is cut off to ground level to facilitate movement of the machine.

3.1.3 Survey Works

I. After the completion of piling works, a professional land surveyor shall be appointed to carry out as-built survey of the completed pile points.

II. Using calibrated Theodolite, the canter of completed pile coordinate shall be recorded

III. The difference between completed pile coordinate and the coordinate in the approved drawing shall state in terms of x and y direction in the as built drawing.

3.1.4 High Strain Dynamic Testing (PDA)

Preliminary Works

I. 1.5 ton drop hammer will travel using 40 feet lorry crane to site area.

II. The drop hammer will be unload using lorry crane or crane. Any modified machinery strictly not allowed to enter site.

III. 200mmx200mm reinforced concrete pile with pile working load of 30 tons and test load 60 tons.

IV. Location of PDA test at RC square pile shall first be determined as Engineering approval.

V. Typically testing includes 5% of the total no. of working piles.ge

VI. The hacked pile head will be cut flat using diamond cutter and make good with layer of sand.

VII. Timber cushion or steel plate shall be placed on top of the pile head in order to sustain the impact force from the hammer.

VIII. Pile wastage shall be placed shall be placed under the cage to act as supporter if soil is not firm enough to receive the loads of hammer and cage.

IX. Cage shall be placed on the area of the test pile by using crane.

X. Once the cage is stable on its stand, 2 numbers of chain block which 3 tons each shall be positioned at the top of the cage.

XI. Each handle of the hook shall be hung to a chain block.

XII. 1.5-ton hammer shall be hung to a hook at the height which is determined by test personnel.

3.1.5 PDA Works

XIV. One of the chain blocks shall be pulled to release the 1.5ton hammer and drop onto the pile.

XV. Hammer shall be hung to a hook at the height which is determined by test personnel.

XVI. Two pairs of strain gauges and accelerometers which are attached to the pile shall then pick-up the force/velocity traces of these waves according to the actual reactions of the pile concerned.

XVII. As the force measurement is a proportional measurement of load applied to the test pile, therefore the load capacity of pile could be measured in this manner using the Pile Driving Analyzer (PDA) and its system.

XVIII. Exposed pile head length of three (3) times the pile size to ensure the collection of a good field data. As shown in **Figure 5**

XIX. 3 nos of each 6mm diameter hole on opposite sides of the pile head for the attachment of the strain gauges and accelerometers using Ramset anchor bolts.

Figure 4: PDA test set

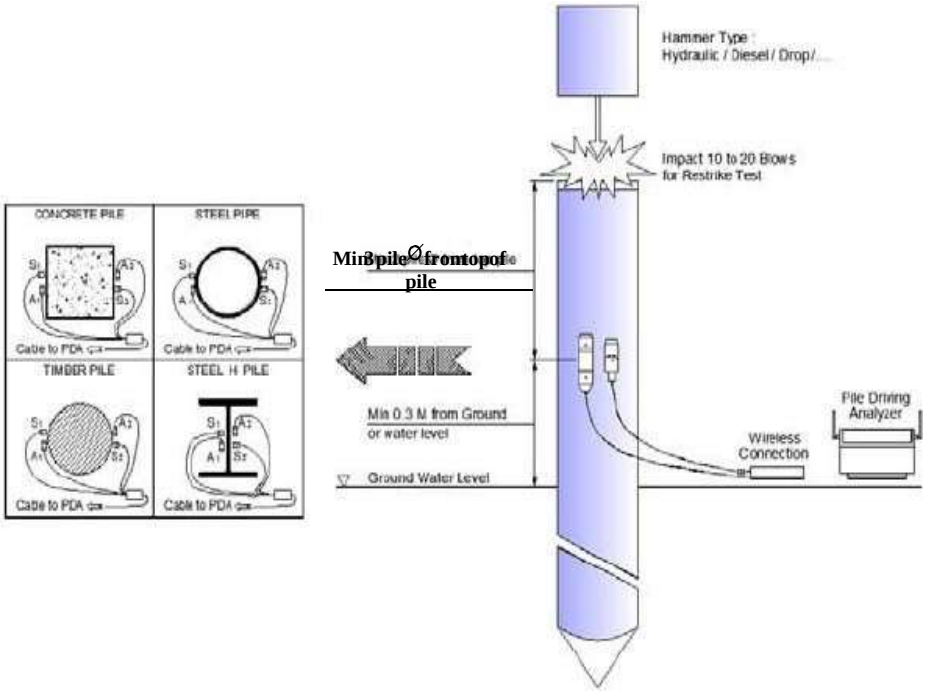


Figure 5: PDA system

XX. On board crane or PDA crane will be used to operate the piling hammer to induce a driving force on to the pile head. As shown in **Figure 4.**

XXI. Dynamic measurement of force and velocity will be collected by the strain gauges attached on to the pile head.

XXII. This data will be processed by the PDA to give immediate visual and permanent record on site.

XXIII. Once the testing operation is completed, all the data recorded is automatically saved onto the PDA and will be transferred for subsequent CAPWAP analysis.

XXIV. CAPWAP (CAse Pile Wave Analysis Program) combines measured force and velocity data with wave equation analysis to obtain the soil resistance effects acting on the pile.

XXV. A representative blow shall be selected from the pile top force and velocity signals recorded in the field. This representative blow selected shall be subjected for further analysis using CAPWAP suite of computer software.

XXVI. CAPWAP analysis involves applying the measured pile top force/velocity time record as a boundary condition to a wave equation model of the pile comprising of continuous segments.

XXVII. When good agreement is obtained between measured and computed pile top data, the soil resistance parameters are assumed to provide the best accurate model of the actual soil behaviour.

XXVIII. Hence, the computed load capacity obtained through the CAPWAP analysis shall give us the best estimates of the actual capacity contributed both by the shaft resistance end bearing.

XXIX. A typical presentation of the CAPWAP results will be as follows:

I. CAPWAP model – match curve of computed pile top force to the measured pile top force time record.

II. Total computed soil capacity contributed by the shaft resistance and end bearing.

III. Computed Load Vs Settlement Curves.

3.2 The construction of foundation

3.2.1 EXCAVATION WORKS

3.2.1.1 Excavation work (Depth less than 1500mm)

a. Excavation work of 1500mm or less is still consider a hazard whereby the embankment may collapse due to lose and unstable soil. To eliminate or minimize the hazard, excavation work using slope method will be used.

Excavated earth must be 2 meters away from excavated pit edge. This is to ensure loose soil from excavations do not fall back into the pit.

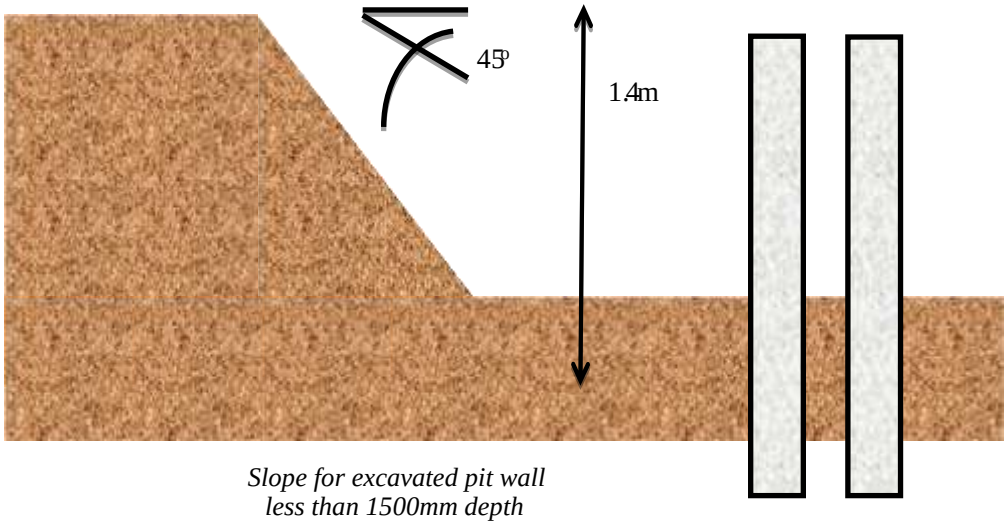
b. The excavated area must be barricaded at all time. Supervisor must be at site during excavation work. To use proper ladder for access into excavation pit.

c. Excavation pit levels shall be check for correct depth inspected and approved by Clerk-of-Work before next stage of work.

d. Mark pile cut-off level and commence pile hacking accordingly. After pile hacking, clear area around pile head of debris or loose concrete. Ensure adequate rebar length from pile remains (min. 300mm).

e. Prepare crusher Run bed to thickness as per requirements. To ensure crusher Runs are compacted properly.

f. Prepare mixture of lean concrete accordingly and lay onto Crusher Run bed and trowel to level.



Slope for excavated pit wall less than 1500mm depth

Figure 6: slope for excavated pit wall

3.2.2 INSTALLATION OF REINFORCEMENT

a. Identify sizes, length and shape of rebar for element as per Approved Construction Drawing.

b. Ensure all rebars are securely tied to prevent dislodgement. Check and ensure lapping lengths are as per standards or specifications.

c. Carry out rebar inspection by engineers or clerk-of works.

3.2.3 INSTALLATION OF FORMWORK

a. All timber for formwork shall be check upon delivery to site for quality or straightness. Any defective materials shall be rejected immediately and recorded in the Delivery Order (D.O.)

b. Pre-fabricate formwork where appropriate according to structure type.

c. Ensure all formwork are properly covered with a layer of formwork oil on surfaces receiving concrete.

d. Identify correct formwork and install accordingly. Check and ensure adequate shoring/strutting are in place before concreting.

e. After installation, check for alignment and orientation as required.

3.2.4 CONTROL OF NON-CONFORMING PRODUCTS

a. In the actual situation on the site, if the concrete cover is assumed not enough (ex. Starter bars or dowel bars installed of the right position), a proper means to gradually adjust the position or rebar will be determined based upon consultation and approval of Engineer.

b. As a matter of course, remedial actions will be taken immediately prior to concrete pouring or formwork closing. When improper installation of rebar is discovered during inspections.

3.2.5 PRECONCRETING INSPECTION

a. The exact date and time of site inspection prior to formwork closing or concreting will be informed to the Engineer as early as possible, by using the approved forms. However, because of the very tight schedule of the whole project, the arrangement of inspection time needs to be flexible.

b. The rebar work checklist attached will be provided to inspect rebar installation. This sheet will be filled by the Construction Team who is not only performing the internal inspection but also attends the inspection by the Engineer. Any Corrective Actions arising from the rebar inspection will be rectified as commented and re-inspection shall be initiated where required.

3.2.6 PRE-CONCRETING WORK PLANNING

3.2.6.1 Preparation

a. Contractor shall ensure that all gate passes, permits, tools, materials for safety precautions, manpower and equipment are available before commencement of work.

b. The Site Team shall make sure that access roads are always clear from any obstruction and site is always accessible.

3.2.6.2. Site Clearance

a. Before work commencement, the area shall be cleared of all debris, materials or other obstructions.

b. Required levels are to be confirmed and verified by Site Engineer and Clerk of Work before commencing the work.

.

3.2.6.3 Traffic Management

a. The Site Team with the assistance of the Safety Officers shall coordinate logistics and materials movement through site following the direction and road signs displayed on site. The required diversion routes shall be marked on drawings including the required traffic signs.

b. The Work Permits and Operator Certificates shall be compiled and files for reference by authorized personnel.

c. Temporary traffic signs, barriers and flagmen will be deployed to control traffic flow according to HSE Plan - Traffic Management & Roadwork Construction to suit site condition.

3.2.6.4 Concrete Pouring and Placing

Prior to any concrete pouring, quality checks are to be completed and the" approval to concrete" instruction issued by client/consultant.

Concreting shall be placed in either manner:

- Direct (or Chute) discharge
- Crane using Bucket
- Concrete pump
- Excavator
- JCB

The method used shall depend on site conditions and pour volume. The concrete shall be placed in accordance with the specification for concrete casting and the main points being mentioned above.

3.2.6.5 Pouring

Concrete is to be placed as close as possible to its final position and not moved laterally by vibration. To ensure concrete are not over vibrated.

Concrete is not to be dropped from height exceeding 2m.

Cold joint of more than 40 minutes shall be avoided. Concrete shall be placed not later than one hour after the addition of the mixing water.

During rainy season or when it rains while concreting, ensure water pumps are on standby

3.2.6.6 Concrete Curing

After the initial concrete setting and when the concrete are hard enough, the exposed concrete surface shall be covered with wet gunny sack where necessary. These sacks shall be left in position and maintained in a soaked condition for at least 3 days minimum.

After the removal of formwork, the element shall be checked for level, dimensions, surface defects, any non-conformity will be brought to client and consultant attention.

3.2.7 BRICKWORKS

a. Upon completion of concrete base, mark out position for brickwork.

b. Ensure concrete surface are thoroughly clean of debris and oil.

c. Prepare lean concrete of cement & sand mixture for base and infill.

d. Ensure delivered bricks are in acceptable condition and soak in water before using.

e. Lay the bricks to the required height and thickness accordingly.

f. Ensure 'EXMET' are laid at every 4^{th} course of bricks.

g. After completion of brickwork, allow for at least 3 days before commencement of plastering.

h. Ensure plastering surface are even and no blemishes visible

3.2.8 BACKFILLING

a. Ensure all underground services are provided, tested or partially tested and approved prior to proceeding for backfilling. The backfill shall be brought to the suitable level above grade to provide for anticipated settlement and unless indicated otherwise, is to be sloped away from the structure. Backfilling material around of structure shall only be hand placed. Compaction of backfilling within one meter of the structure shall only be achieved by manually operated tools & equipment.

b. Towed or self-propelled vibrating rollers or heavy compaction equipment's shall not be used within one meter of any structure whereby smaller hand operated compactor shall be used.

3.2.8.1 For fill below ground slabs:

a. The installation of cable ducts for services entries and service pipework are to be completed before placing of the fills receiving the ground slab. The compacted fill or hardcore is to be shaped and trimmed to the required levels and dimensions and blinded with sand. Backfilling shall be done equally on both sides of walls.

b. Sufficient distance as approved by Engineer to be maintained from the structure to avoid damages during compaction with heavy equipment and small equipment shall be used around the structure to achieve the degree of compaction required. Backfilling materials shall be shifted with the help of shovel/Bobcat in a safe manner.

The fill material shall be thoroughly compacted using compactor for structures. For structural backfill, the material shall be placed in a layer within the effective range of compaction of the plant provided that the maximum loose (uncompact) thickness of each layer shall not exceed 200mm to 300mm. Similarly, the next layer of backfill shall be carried out as per above sequence until desired level is achieved

3.2.9 COMPLETION OF WORKS

a. All Scraps/debris shall be dispose out of site.

b. Housekeeping to be done and site inspection are to be carried

c. Conduct inspection of completed works, and ensure that all work is according to Scope, Approved construction Drawings and Specifications

3.4 machinery and equipment used for construction of foundation.

Machinery and equipment used for piling work and construction of foundation, there have some machinery and tools need to be used for piling work and completion of foundation

3.4.1 Piling

The following hydraulic static machine and appurtenances will be mobilized to the piling site.

I. 1 unit of piling machine type hydraulic static pile driver. (M20)
II. 20-ton crane
III. 200x200 RC square pile & Cast Iron Pointed shoe pile
IV. On-Board 5 tonne Winch
V. Lorry Crane

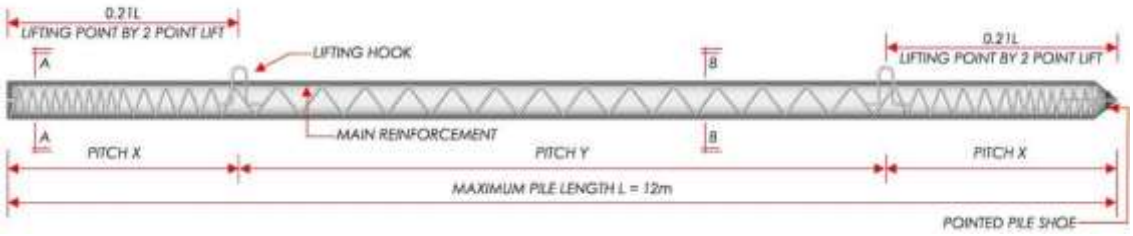


Figure 7: RC Square Pile

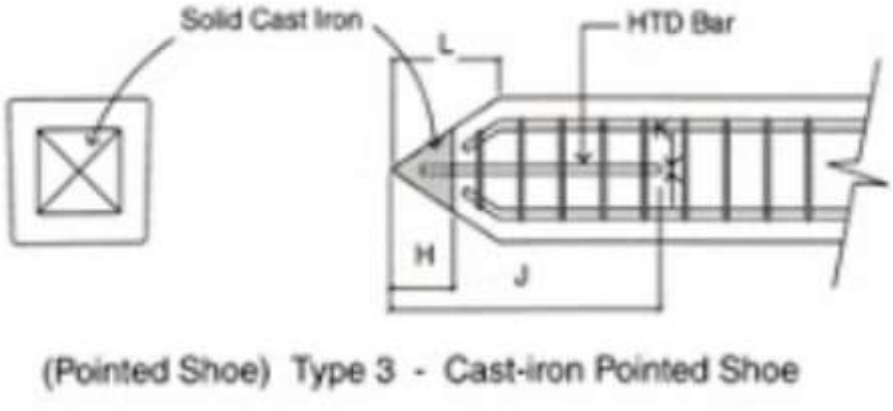


Figure 8: Type of Shoes pile: Cast Iron Pointed

Figure 9: Hydraulic pile driver machine. (M20)

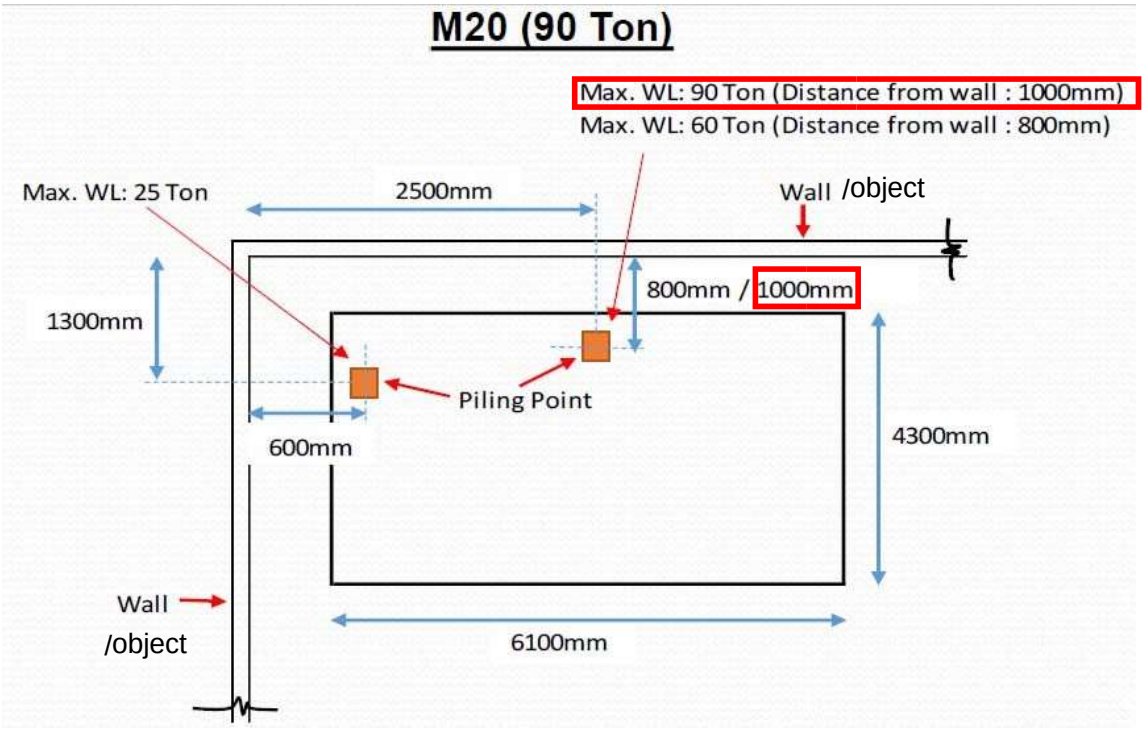
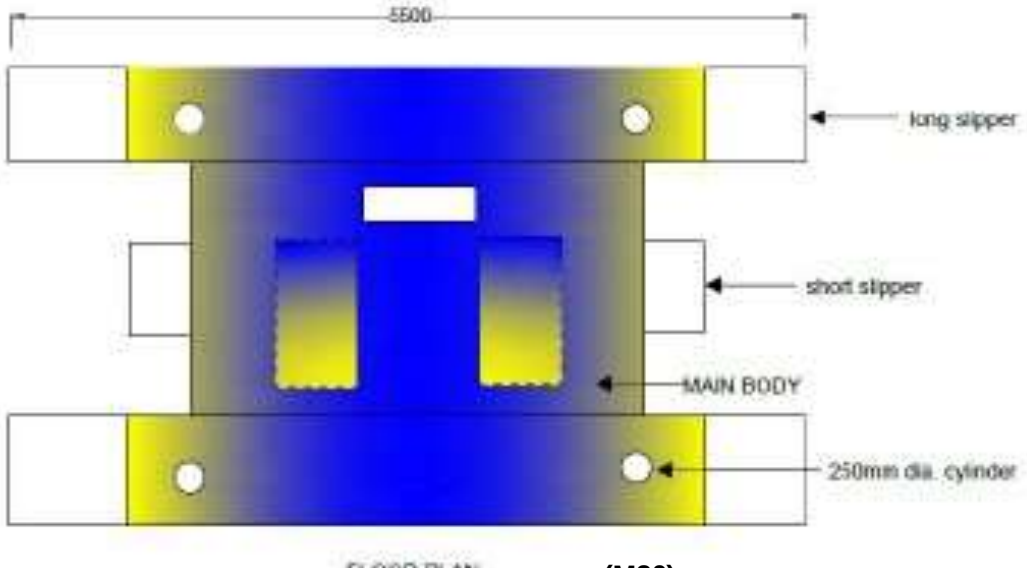


Figure 10: Minimum allowable clearance distance from pile canter to nearest object

Machine Structure



FLOOR PLAN **(M20)**

Figure 11: Floor Plan Pile Driver

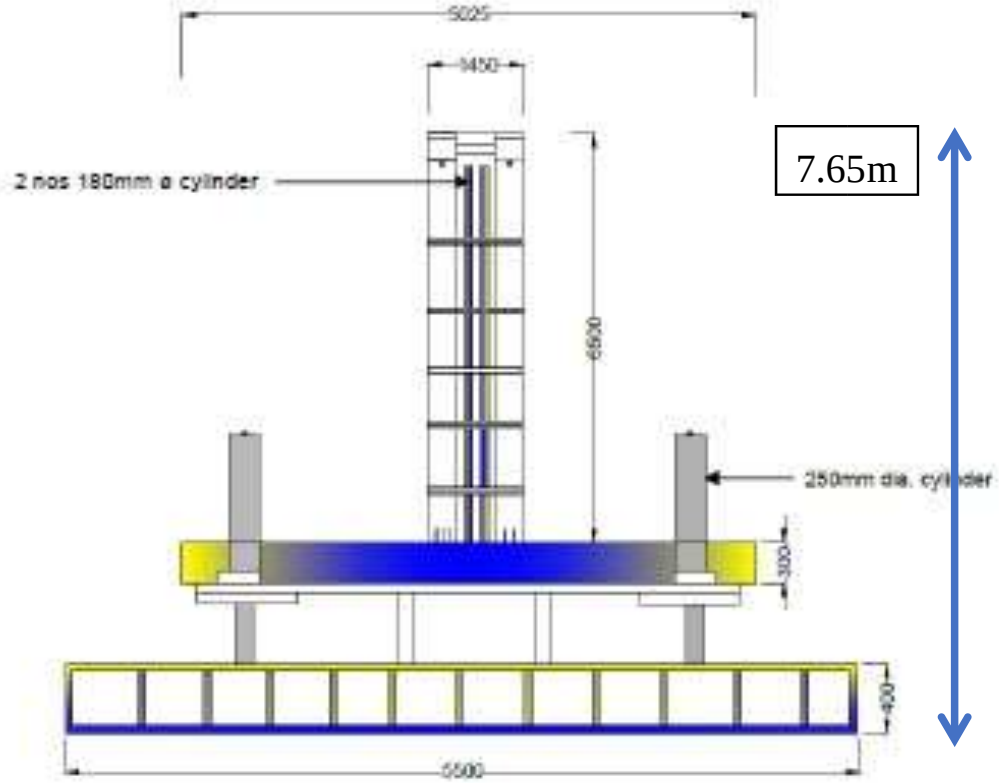


Figure 12: Front Elevation Pile Driver

FRONT ELEVATION

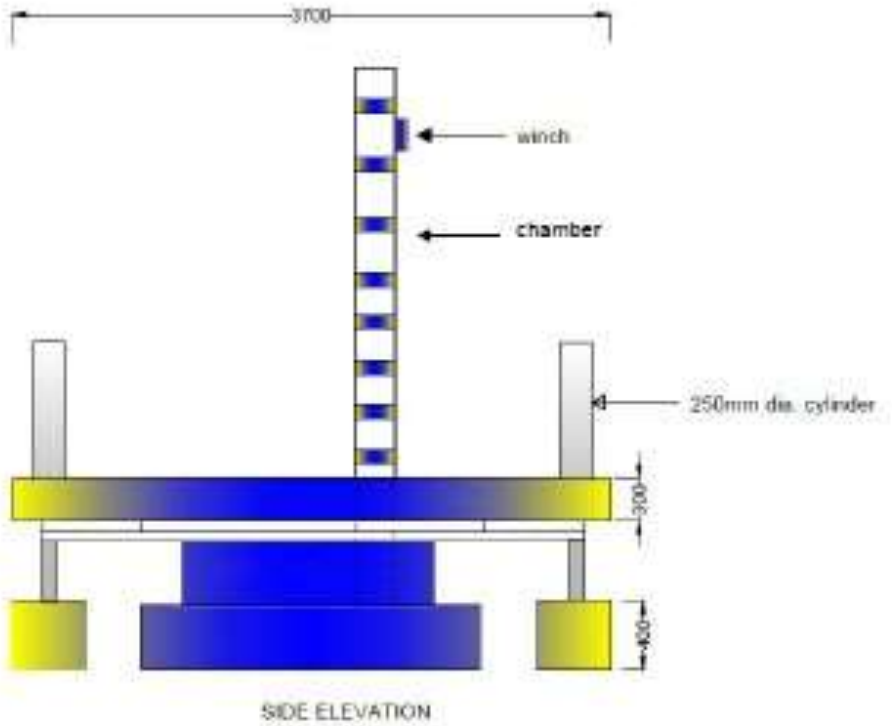


Figure 13: Side Elevation Pile Driver machine

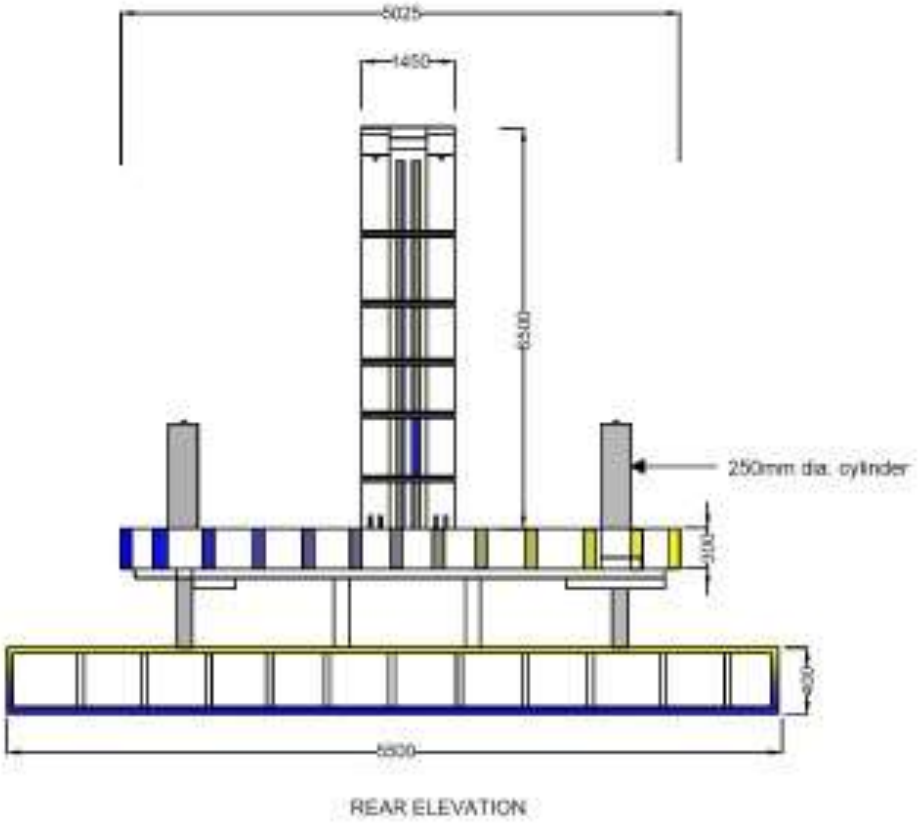


Figure 14: Rear Elevation Pile Driver machin**e**

MAXIMUM JAKING FORCE (T)	90 T (M20)
APPLICABLE RC SQUARE PILE	150MM, 175MM, 200MM
SINGLE STROKE DISTANCE	3.00 M
SIDE CHAMBER WORKING SPACE	MAX. LOADING
- LENGTH	3.10 M
- i) WIDTH	0.80 M (60 Ton)
- ii) WIDTH	1.00 M (90 Ton)
CORNER CHAMBER WORKING SPACE	MAX. LOADING 25 TONNE
- LENGTH	1.30 M
- WIDTH	0.60 M
OVERALL WEIGHT (T) MAIN FRAME	 27 TONNE
WIDTH LENGTH HEIGHT	4.30 M 6.10 M 7.65 M

Table 1: Hydraulic static pile driver. (M20)

Specifications

1. Capacity of Pile Driving:			
1.1 At the normal speed position:			
i) Maximum pile driving force			900KN
ii) Speed of pile driving			2.0m/min
1.2 Depth of pile driving:			
i) First phase			0.3m
ii) Second phase			2.7m
iii) Third phase			2.7m
2. Moving Capacity:			
Distance of each movement: longitudinal			1.4m
horizontal			0.3m
Each turning angle:			11°
Speed of moving:	forward		4.0m/min
	backward		4.0m/min
	left		4.0m/min
	right		4.0m/min
3. Size of Piles:			
i) Pipe pile:	maximum		ø250mm
ii) Square pile:	maximum		□200mm
iii) Length of single pile:	a)	≥3.0 m, ≤6 m	(middle pile)
	b)	≥3.0 m, ≤6m	(side pile)
4. Hydraulic System:			
i) Rated pressure:			3000 psi
ii) Rated flow:			43cc/min
Note: Power pack no: HINO 6D14			
5. Weight:			
i) Body + Power pack			22t
ii) Chamber			5t
6. Dimensions when Working:			
Length x Width x Height = 6.10m x 4.30m x 7.65m			
7. Distance of Side Piles to the Building:			0.80m

Table 2: Specification static pile driver. (M20)

Figure 15: 8-ton lorry crane to transport pile machine and RC Pile

Figure 16: 25-ton crane to assemble piling machine

3.4.2 PDA Test

The following hydraulic static machine and appurtenances will be mobilized to the PDA test site.

I. Backhoe
II. 20 Ton Crane
III. 8ton lorry crane
IV. PDA Test frame
V. 1.5 tons drop hammer
VI. Accelerometer & Strain gauges
VII. Pile Driving Analyzer
VIII. Ramset Anchor Bolt

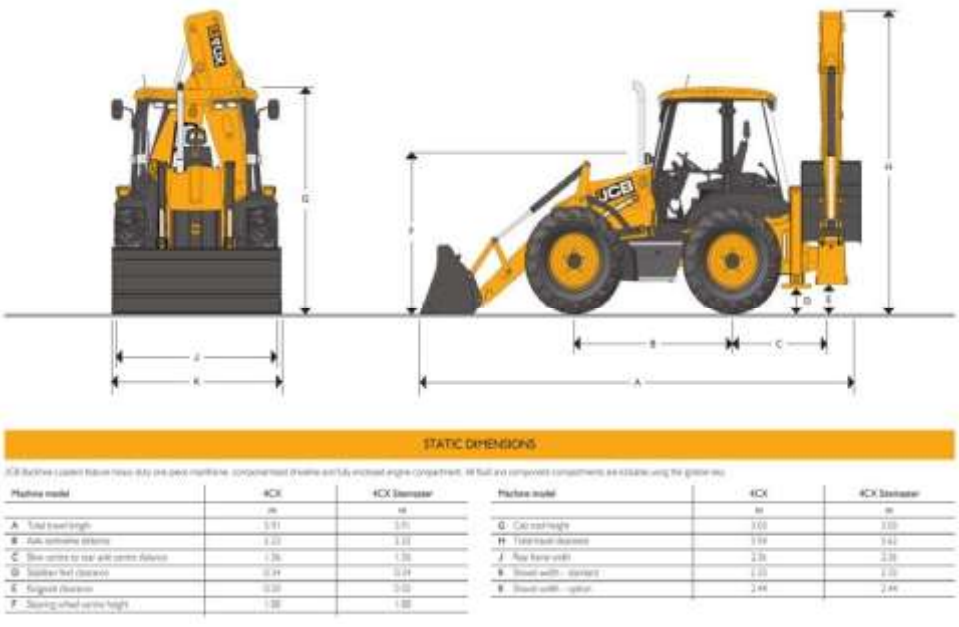


Figure 17: Backhoe to excavate for PDA

Figure 18: 25-ton crane lift and install PDA Test frame

Figure 19: PDA Test Cage

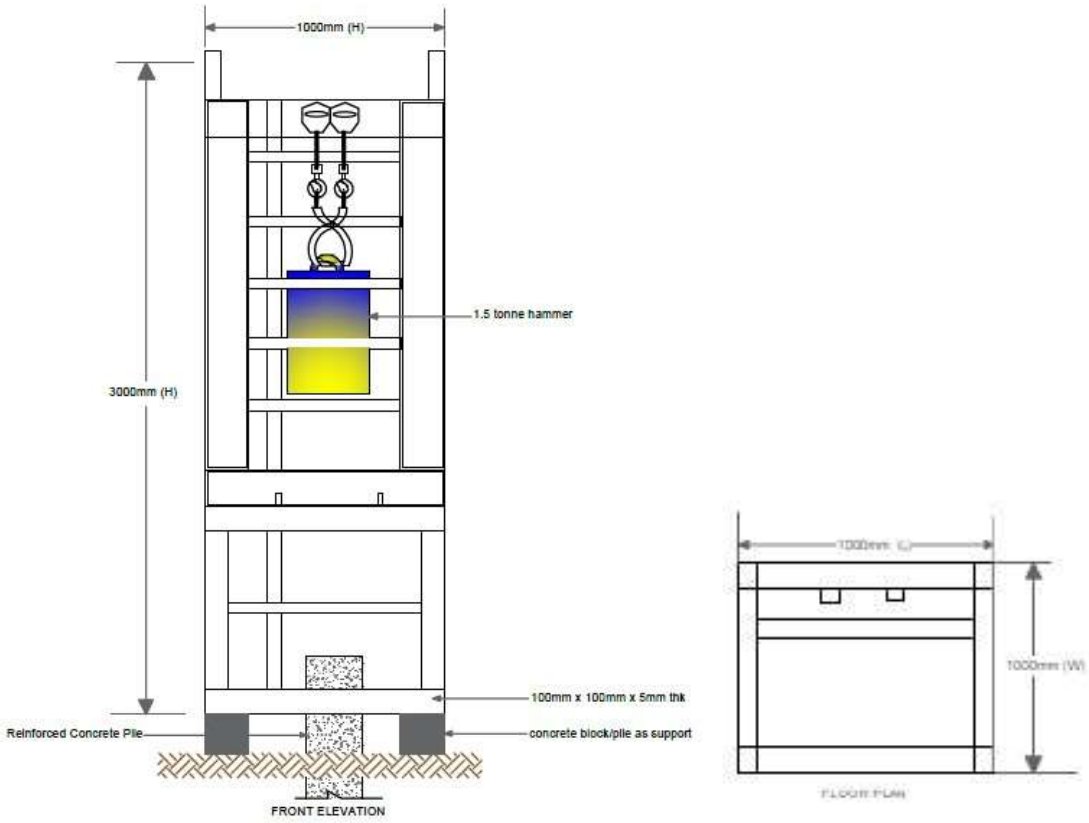


Figure 20: 1.5 tonne drop hammer

Figure 21: Ramset Anchor Bolt

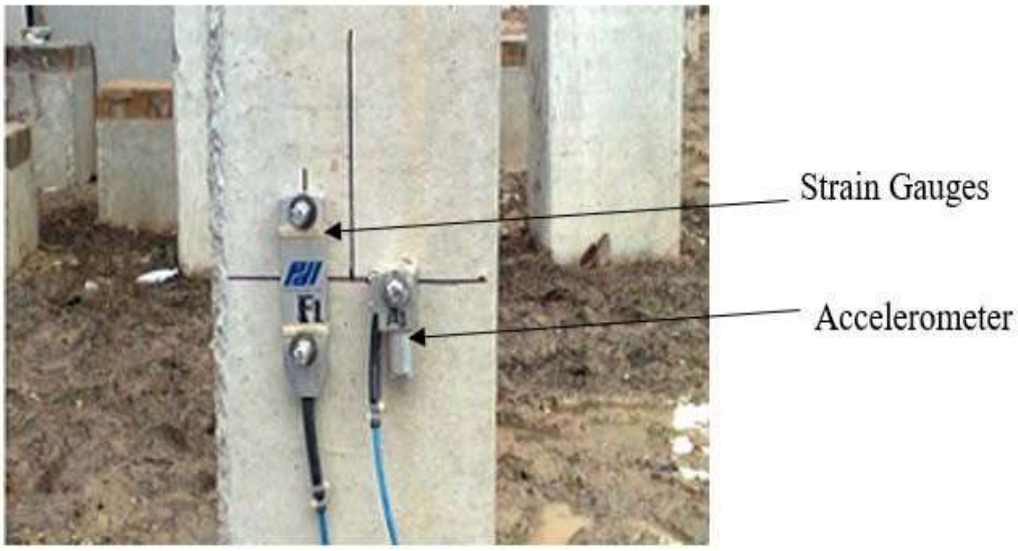


Figure 22: Accelerometer & Strain gauge

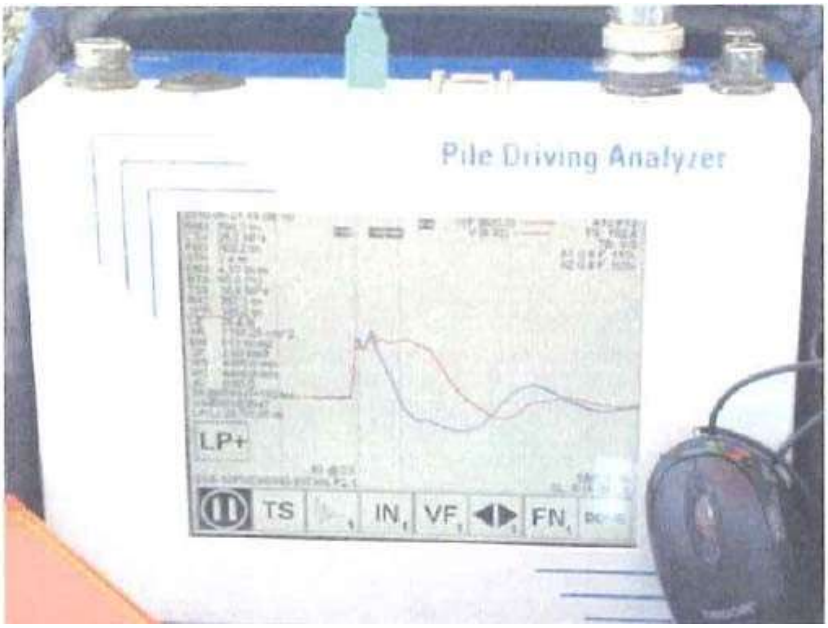
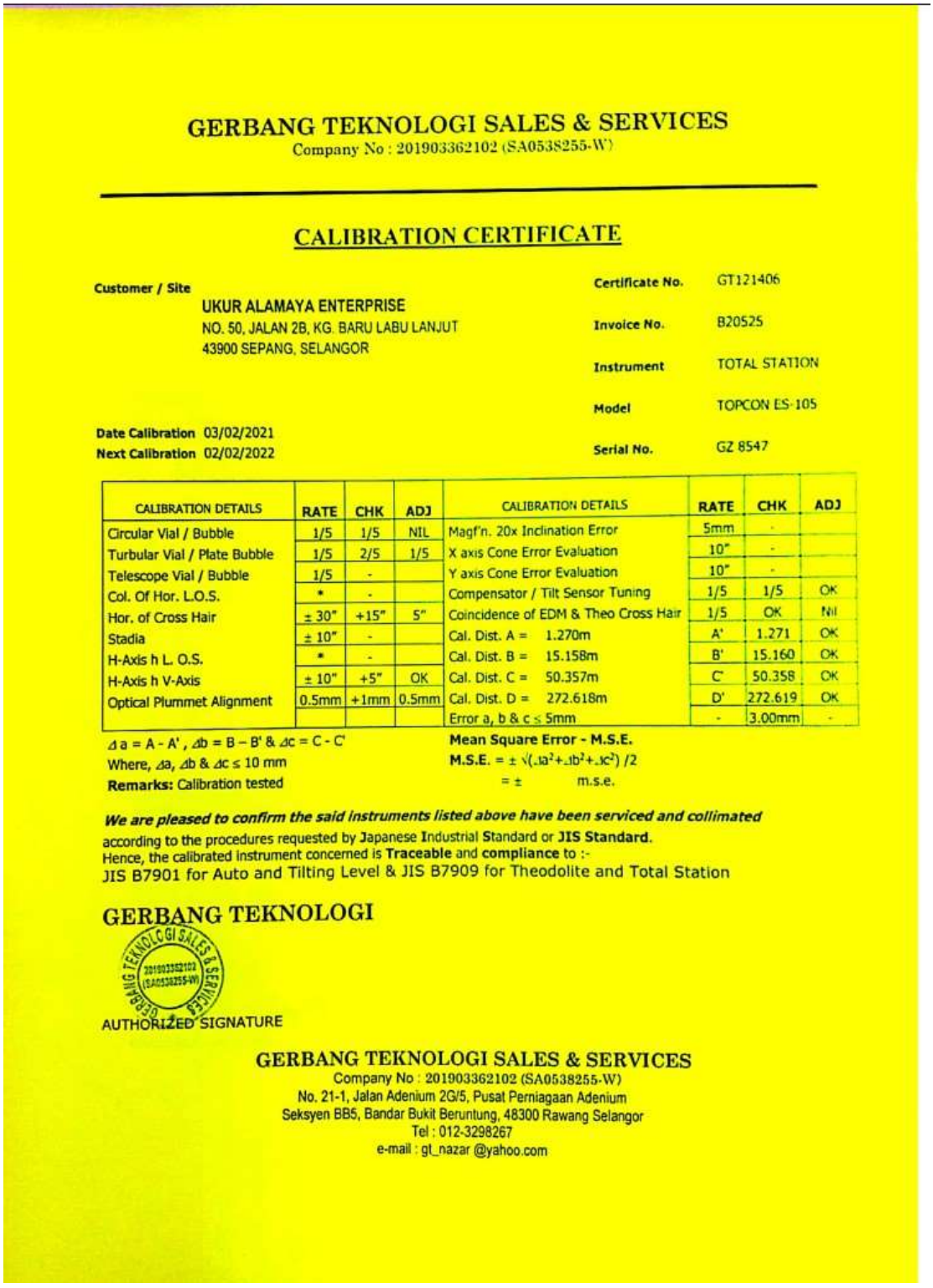


Figure 23: Pile Driving Analyzer

3.3 Survey Equipment (Total Station)



GERBANG TEKNOLOGI SALES & SERVICES
Company No : 201903362102 (SA0538255-W)

CALIBRATION CERTIFICATE

Customer / Site
UKUR ALAMAYA ENTERPRISE
NO. 50, JALAN 2B, KG. BARU LABU LANJUT
43900 SEPANG, SELANGOR

Certificate No. GT121406
Invoice No. B20525
Instrument TOTAL STATION
Model TOPCON ES-105
Serial No. GZ 8547

Date Calibration 03/02/2021
Next Calibration 02/02/2022

CALIBRATION DETAILS	RATE	CHK	ADJ
Circular Vial / Bubble	1/5	1/5	NIL
Turbular Vial / Plate Bubble	1/5	2/5	1/5
Telescope Vial / Bubble	1/5	-	
Col. Of Hor. L.O.S.	*	-	
Hor. of Cross Hair	± 30"	+15"	5"
Stadia	± 10"	-	
H-Axis h L. O.S.	*	-	
H-Axis h V-Axis	± 10"	+5"	OK
Optical Plummet Alignment	0.5mm	+1mm	0.5mm

CALIBRATION DETAILS	RATE	CHK	ADJ
Magf'n. 20x Inclination Error	5mm	-	
X axis Cone Error Evaluation	10"	-	
Y axis Cone Error Evaluation	10"	-	
Compensator / Tilt Sensor Tuning	1/5	1/5	OK
Coincidence of EDM & Theo Cross Hair	1/5	OK	Nil
Cal. Dist. A = 1.270m	A'	1.271	OK
Cal. Dist. B = 15.158m	B'	15.160	OK
Cal. Dist. C = 50.357m	C'	50.358	OK
Cal. Dist. D = 272.618m	D'	272.619	OK
Error a, b & c ≤ 5mm	-	3.00mm	-

$\Delta a = A - A'$, $\Delta b = B - B'$ & $\Delta c = C - C'$
Where, Δa, Δb & $\Delta c \leq 10$ mm
Remarks: Calibration tested

Mean Square Error - M.S.E.
M.S.E. = $\pm \sqrt{(\Delta a^2 + \Delta b^2 + \Delta c^2)} / 2$
= ± m.s.e.

We are pleased to confirm the said instruments listed above have been serviced and collimated according to the procedures requested by **J**apanese **I**ndustrial **S**tandard or **JIS Standard.**
Hence, the calibrated instrument concerned is **Traceable** and **compliance** to :-
JIS B7901 for Auto and Tilting Level & JIS B7909 for Theodolite and Total Station

GERBANG TEKNOLOGI

AUTHORIZED SIGNATURE

GERBANG TEKNOLOGI SALES & SERVICES
Company No : 201903362102 (SA0538255-W)
No. 21-1, Jalan Adenium 2G/5, Pusat Perniagaan Adenium
Seksyen BB5, Bandar Bukit Beruntung, 48300 Rawang Selangor
Tel : 012-3298267
e-mail : gt_nazar @yahoo.com

Figure 24: example of calibration certificate

3.4 Conversion Table for Hydraulic Pile Driver (M20)

CALCULATION OF SETTING PRESSURE 90T (M20)

1) EFFECTIVE INTERNAL BORE DIAMETER OF INJECTION CYLINDER - 200MM (7.874 In)

2) EFFECTIVE INTERNAL BORE DIAMETER OF INJECTION CYLINDER - 3.142 x 3.937² - 48.70 In

3) CONVERSION FACTOR FOR ONE (1) METRIC TONNE - $\frac{2204\ lb}{48.70\ In}$ - 45.26 psi

4) 2 CYLINDER - $\frac{45.26\ psi}{2}$ - 22.63 psi

5) CONVERSION TABLE:

PSI	METRIC TONNE
22.63	1
113.15	5
226.30	10
339.45	15
452.60	20
565.75	25
678.90	30
792.05	35
905.20	40
1018.35	45
1131.50	50
1244.65	55
1357.80	60
1470.95	65
1584.10	70
1697.25	75
1810.40	80
1923.55	85
2036.70	90

Table 3: Calculation of setting pressure

CHAPTER 4.0 CONCLUSION

The conclusion for this report is about piling work, construction of foundation and acryl work located at lot no lot 45371, Danga Bay, Bandar dan Daerah Johor Bahru, 81200 Johor Bahru, Johor Darul Takzim for Tenaga Nasional Berhad. The objective for this report is to identify how piling work are done, how the foundation was construct and what equipment and machinery are use in this project. From this report, we know that to do a piling work must use some piling depends on how the soil situation; PDA test must be done after the work of the pile to ensure that the condition of the pile is strong enough to withstand the load on it. For the construction of foundation, there are have some work such as excavation work, installation of reinforcement bar, installation of formwork, preconcerting work, brickwork, backfilling work and completed of work. Besides, the machinery and equipment used for construction foundation and piling work was included. The machinery and equipment not told in details because only uses large machines and equipment and it is difficult to obtain additional information. Although, the piling work, construction of foundation and the machinery and equipment that used in this construction can be seen more closely and make an experience.

REFERENCES

Turcomp Engineering Services Sdn Bhd (2021) [Online] available:

https://www.turcomp.com/. Retrieve turcomp.com was first indexed by Google more than 10 years ago.

Groundforce Specialist Construction Solution (2015) what is piling? [Online] available:

https://www.vpgroundforce.com/. Retrieve on 2015.

U&M Group (2016) piling does [Online] available

https://underpin.com/how-does-piling-work/ . Retrieve on 1977

Shuanglong Machinery Co. (2012) How to Construct Pile Foundation [Online] available:

https://www.machinesl.com/piling-construction/ . Retrieve on 2013

The Constructor Building Idea (2013) What is a Foundation in Construction? [Online] available:

https://theconstructor.org/geotechnical/ . Retrieve on 2014

Kathleen Kuiper (2012) foundation [Online] available:

https://www.britannica.com/technology/foundation-construction/ . Retrieve on 2019

Jeasika (2016) What do you mean by foundation in a building? [Online] available:

https://basiccivilengineering.com/2016/05/mean-foundation-building.html/. Retrieve on 2022

BIGRENTZ (2020) Types of Foundations Found in Construction Projects [Online] available: https://www.bigrentz.com/blog/types-of-foundations. Retrieve on 2020

UNDERSTANDING BUILDING CONSTRUCTION (2018) TYPES OF FOUNDATIONS [Online] available:

http://www.understandconstruction.com/types-of-foundations.html. Retrieve on 2019

ScienceDirect (2020) Foundation Engineering [Online] available:

https://www.sciencedirect.com/topics/engineering/foundation-engineering. Retrieve on 2022

Project Management 123 (2015) Method statement for piling work at construction work [Online] available:

https://projectmanagement123.com/method-statement-for-piling-works-at-construction-project/. Retrieve on 2015

BBG Infrastructure (2019) Structural & Piling Works [Online] available:

http://www.bbginfrastructure.com/structural-and-piling-works.php. Retrieve on 2019