UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

FACULTY OF ACHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

SEPTEMBER 2014

It is recommended that this practical training report prepared

by

MUHAMAD AMIRUL ADLI BIN MOHAMAD AZMAN

2012858138

Entitled

SUBSTRUCTURE (PILING SYSTEM)

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

Report Supervisor	En. Zulkifli Bin Abdul Halim
Practical Training Coordinator	Pn. Wan Nor Diana Binti Wan Ali
Faculty Coordinator	Dr. Mohd Rofdzi Bin Abdullah

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STUDENT'S DECLARATION

I hereby declare that this report is my own work, except for extracts and summaries for which the original references are stated herein, prepared during a practical training sessions that I underwent at Abdul Rahman Richard Architect (ARRA) for a duration of 4 months starting from 5 June and ended 10 October 2014. It is submitted as one of the prerequisite requirements of DBN307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

Name: MUHAMAD AMIRUL ADLI BIN MOHAMAD AZMAN

UiTM ID No: 2012858138

Date:

ACKNOWLEDGEMENT

Alhamdulilah, all praises to Allah for this strengths and His blessings in completing this report. Special thanks goes to my project supervisor, En. Faizal Bin ismail and En. Amir Bin Ahmad, for his supervision and constant support. His invaluable help of constructive comments and suggestion throughout the experimental and thesis works have contributed to the success of this research. Not forgotten, my appreciation to my site engineer, En. zamakusyairi for his support and knowledge regarding this topic. I would like to express my appreciation to the site contractor which also is the project manager for Klinik Kesihatan Kuala Lumpur, En. Musyam Bin Mohammed from RD resources for their support and help towards my postgraduate affairs. Not to forget, appreciation is given for the site safety officer, En.Rafizie Bin Abdul Rahim for his guidance that leading me until my report is completely finish. My acknowledgement also goes to all the technician and office staff of project Klinik Kesihatan Kuala Lumpur for their co-operations. Sincere thanks to my lecture supervisor Pn. Wan Nordiana Binti Wan Ali for their guidance, advice and moral support during do this report in successfully. Thanks for their concern in ensure to being success at training time. Not forget, great appreciation go to the rest Practical Training Coordinator Pn. Nurul Huda Binti Abdul Hadi and faculty's coordinator Dr. Mohd Rofdzi Bin Abdullah. Last but not least, my deepest gratitude goes to my beloved parents,

and also to my siblings for their endless love, prayers and encouragement. To those who indirectly contributed in this report, your kindness means a lot to me. Thank you very much.

ABSTRACT

Substructure is very important for a construction, therefore this report about the substructure in a building based on the Uniform Building By Law (UBBL). This report was conducted for the building structure at Klinik Kesihatan Kuala Lumpur. The objective of this report is to learn and study about the function of the substructure and its requirement to make it suitable with the building. It will focus on the part of substructure that provide a suitable material for a typical building, such as single storey building or multi storey building. This report will also look at the criteria of the substructure to being choosen for a building.

Contents **page**

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

UBBL (Uniform Building By-Law)

UiTM (Universiti Teknologi MARA)

CIDB (Construction Industry Development Board)

CHAPTER 1

PREFACE

1.1 Introduction

In this semester, we have been given a task to do practical in a company and provides discretion to report given at the end of this semester. I have chosen an architect company named Abdul Rahman Richard Architect (ARRA). I chose this company as practical discretion to do as the company has many projects and site construction. This has given me the opportunity to complete my report and learn more about the construction industry. other than that, I was able to learn how to do a construction drawing using an Autocad software. in a given period of 4 months, I have gained a lot of knowledge about the construction industry with more depth and experience provided by this company I can use for future use. also helped a lot is RD Resources which share experience, knowledge and guidance that is useful to me during this practical training session. I also learn how to be a great contractor so that, the site workers can hear our commands with clearly and with respectfully.

1.2 Objective

-To learn and study about the substructure type and function in building
-To study the installation of piling
-To observe the important of substructure in building.
-To study the advantages and disadvantages of piling system

1.3 Scope of study

For this report, the scope of study only focus on how the substructure is made, what material used in the different type of substructure and what type of soil condition whether it is suitable with the substructure or not.

1.3 Method of study

- Observation at site construction.

Figure 1.3.1 : Orservation at site construction (Klinik Kesihatan Kuala Lumpur).

- Interview with the worker at the site

- .

Figure 1.3.2 : Interview with one of the site worker.

- Going to Perpustakaan Negara to get extra acknowledgement.

Figure 1.3.3 : Picture of Perpustakaan Negara.

CHAPTER 2

COMPANY BACKGROUND

2.1 Introduction

Introduction & Philosophy

arra
Abdul Rahman Richard Architect

ABDUL RAHMAN RICHARD ARCHITECT
is a dynamic, Bumiputera-owned consultancy firm providing a wide range of inspiring, sustainable architectural designs for development.

ABDUL RAHMAN RICHARD ARCHITECT
operates in four principal market sectors:
Commercial, Institutional, Residential and Interior Design which we have developed to a high standard over our entire working experience.

Complex assignments require integrated solutions.
Advanced computing facilities and latest software used for the analytical works allow our highly skilled and
experienced staff to evaluate a full range of options and to deliver the *most practical* and *cost-effective* solutions from inception through to completion.

Our mission is to make
ABDUL RAHMAN RICHARD ARCHITECT
a preferred consultant with emphasis on delivering optimum and integrated architectural solution to meet our Client's needs.

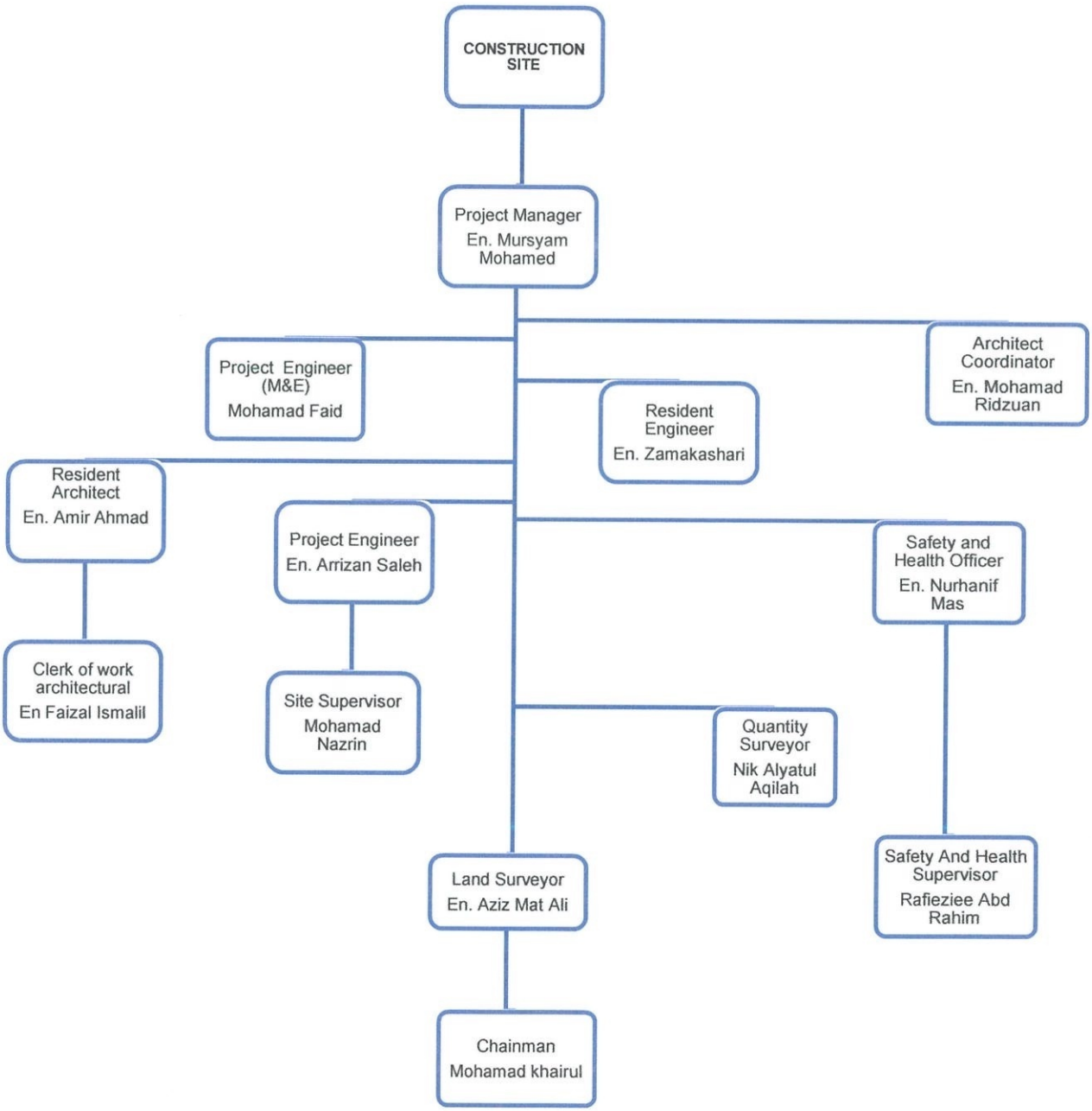
2.2 Company Profile

2.0COMPANY INFORMATION

Name of Company	Abdul Rahman Richard Architect
Kuala Lumpur Office	**No. 19-2, Jalan Wangsa Delima 2A,** **Seksyen 5, Wangsa Maju,** **53300 Kuala Lumpur.**
Telephone No.	
Facsimile No.	
Kota Kinabalu Office	**Lot 12, 2nd Floor, Block B,** **Riverside Plaza, Kingfisher Park,** **88450 Kota Kinabalu, Sabah.**
Telephone No.	
Facsimile No.	
Website	**www.arra-architect.com**
Email	arra.architect@gmail.com
Registration(s)	**Pertubuhan Arkitek Malaysia** **Registration No.: M1746** **Board of Architects** **Registration No.: SP/A 127** **Ministry of Finance, Malaysia** **Registration No.: 465-00011293** **Petronas Malaysia** **Registration No.: L-8547-12-A**
Company Secretary	**Massa Consulting House Sdn. Bhd.** **No. 32B, Jalan BRP ½** **Bukit Rahman Putra** **47000 Sungai Buloh, Selangor**

Banker(s)	**Malayan Banking Berhad, Kota Kinabalu, Sabah** **Malayan Banking Berhad, Wangsa Maju, Kuala Lumpur**
Professional Indemnity	**Berjaya Sompo Insurance Berhad** **Limit of indemnity RM 5,000,000.00**

2.3,Organization chart (Site construction)



2.4 List of Project

2.4.1 Completed projects

Table 2.4.1.1 : List of completed project

	Project Title	Client(s)	Estimate Contract Value (RM)	Status
1.	Cadangan Pembangunan Pusat Penjagaan Warga Emas Di Atas Sebahagian Lot 2695, Mukim 6, Pongsu Seribu, Seberang Perai Utara, Pulau Pinang.	Yayasan Albukhary	15.0 million	Completed
2.	Cadangan Pembangunan Pusat Penjagaan Warga Emas Di Atas Sebahagian Lot Pt 73, Mukim 1, Pantai Acheh, Balik Pulau, Pulau Pinang Untuk Tetuan Majlis Agama Islam Negeri Pulau Pinang.	Yayasan Albukhary	15.0 million	Completed
3.	Cadangan Pembangunan Projek Sekolah Menengah Kebangsaan Beaufort 3, Beaufort 3, Sabah.	Kementerian Pelajaran Malaysia	34.7 million	Completed
4.	Proposed Kompleks Budi Penyayang, Kepala Batas, Pulau Pinang.	Yayasan Albukhary	15.0 million	Completed
5.	Cadangan Pembangunan Hospital Nias, Acheh (Phase 1)	Mercy Malaysia	15.0 million	Completed
6.	Cadangan Membina 1 Blok 4 Tingkat Kuarters Kediaman Imam Besar Dan Kakitangan Masjid Negara (21 Unit) Bandar Kuala Lumpur, Wilayah Persekutuan Untuk Tetuan Jabatan Kemajuan Islam Malaysia.	Yayasan Albukhary	15.0 million	Completed
7.	Cadangan Membina Dan Menyiapkan Semula Ibu Pejabat Polis Daerah Dan Perumahan PDRM, Lahad Datu, Sabah.	Pembinaan BLT Sdn. Bhd.	97.8 million	Completed
8.	Cadangan Meroboh Dan Membina Semula Masjid Nurul Yaqin, Di Atas Lot 788, Pekan Pengkalan Kundang, Mukim Rawang, Daerah Gombak, Selangor Darul Ehsan Untuk Tetuan Jabatan Agama Islam Selangor.	Yayasan Albukhary	5.5 million	Completed
9.	Cadangan Meroboh Dan Membina Semula Masjid AlRahman, Di Atas Lot 788, Ulu Bernam, Mukim Rawang, Daerah Gombak, Selangor Darul Ehsan Untuk Tetuan Jabatan Agama Islam Selangor	Yayasan Albukhary	5.5 million	Completed
10.	Cadangan Membina Dan Menyiapkan Sebuah Bengkel Membaikpulih Kapal Terbang (Hangar) Di Atas Sebahagian Lot No. Pt 16, Lapangan Terbang Antarabangsa Sepang (Klia), Selangor Darul Ehsan Untuk Tetuan Sepang Aircraft Engineering Sdn Bhd.	Sepang Air-Craft Engineerig Sdn Bhd	72.0 million	Completed

11.	Cadangan Pembangunan Semula Masjid Nurul Iman, Desa Paya Perupuk, Kecematan Tanjung Pura, Kabupaten Langkat, Daerah Sumatera Utara, Indonesia.	Yayasan Albukhary	1.7 million	Completed
12.	Cadangan Membina 1 Unit Rumah Bunglo Dua Tingkat Di Atas Lot No. 575, Jalan 7, Kg. Seri Gombak, Mukim Batu, Batu Caves, Daerah Gombak, Majlis Perbandaran Selayang, Selangor Darul Ehsan untuk Tetuan Cik Isfaniza Bt. Ismail.	Cik Isfaniza Bt. Ismail	1.0 million	Completed
13.	Cadangan Pembinaan Bangunan Pejabat di PPK Hulu Langat Selatan (Selangor), PPK Tampin (Ng. Sembilan), dan PPK Kota Tinggi Timur (Johor) untuk Tetuan Lembaga Pertubuhan Peladang Malaysia.	Lembaga Pertubuhan Peladang Malaysia	1.9 million	Completed
14.	Projek Kerja-kerja Pengalihan Pagar Istana Arau Dan Bangunan Setiausaha Sulit Kanan DYM Raja Perlis (Di Bawah Butiran Projek Menaiktaraf Jalan Jitra Melalui Kodiang, Kedah ke Arau Perlis).	Jabatan Kerja Raya	20.0 million	Completed
15.	Cadangan Membina Dan Menyiapkan Pusat Aktiviti Kebudayaan, Wilayah Persekutuan Labuan.	Perbadanan Labuan	2.0 million	Completed
16.	Cadangan Pembinaan Pejabat Dan Rumah Kediaman Jabatan Pendaftaran Negara (JPN), Daerah Slim River, Perak Darul Ridzuan untuk Tetuan Kementerian Hal Ehwal Dalam Negeri.	Kementerian Hal Ehwal Dalam Negeri	15.0 million	Completed

2.4.2 Project in progress

Table 2.4.2.1 : List of project in progress.

	Project Title	Client(s)	Estimate Contract Value (RM)	Status
17.	Cadangan Membina Dan Menyiapkan Sebuah Sekolah Menengah Kebangsaan Titingan II, Tawau, Sabah Untuk Tetuan Kementerian Pelajaran Malaysia.	Kementerian Pelajaran Malaysia	28.7 million	Construction Stage
18.	Cadangan Membina Dan Menyiapkan Sekolah Menengah Kebangsaan Terusan (Sepagaya II), Lahad Datu, Sabah Untuk Tetuan Kementerian Pelajaran Malaysia.	Kementerian Pelajaran Malaysia	38.5 million	Construction Stage
19.	Cadangan Pembangunan Projek Fizikal Universiti Teknologi MARA (UiTM) Dalam Rancangan Malaysia Kesembilan (RMK-9) (2006-2010) UiTM Cawangan Sabah (Kampus Kota Kinabalu)	Kementerian Pengajian Tinggi Malaysia	30.0 million	Construction Stage
20.	Cadangan Membina Dan Menyiapkan Sebuah Sekolah Menengah Kebangsaan Beringis, Di Atas Lot 33225, Papar, Sabah.	Kementerian Pelajaran Malaysia	32.0 million	Construction Stage
21.	Cadangan Membina dan Menyiapkan Sebuah Sekolah Menengah Kebangsaan Kabota, Sabah	Kementerian Pelajaran Malaysia	25.0 million	Construction Stage
22.	Albukhary International University, Kedah (Pakage 3&4) - 2 Blok Dewan Makan - Dewan Serbaguna - Pusat Pelajar - Dewan Sukan	Yayasan Albukhary	50.0 million	Construction Stage
23.	Cadangan Membina dan Menyiapkan Sebuah Sekolah Menengah Kebangsaan Taman Ria, Daerah Tuaran, Sabah.	Kementerian Pelajaran Malaysia	9.9 million	Construction Stage
24.	Cadangan Merekabentuk, Membina Dan Menyiapkan, Mengujiterima, Menyelenggara Klinik Kesihatan 4S Nabawan Dengan Dan Kuarters Di Nabawan Sabah.	Kementerian Kesihatan Malaysia	25.0 million	Construction Stage
25.	Cadangan Membina Dan Menyiapkan Pangkalan Unit Udara Polis Di Sungai Besi, Kuala Lumpur.	Polis Diraja Malaysia	60.0 million	Construction Stage
26.	Cadangan Membina Pejabat Jabatan Pelajaran Negeri Sabah, Kota Kinabalu, Sabah.	Kementerian Pelajaran Malaysia	80.0 million	Construction Stage

27.	Cadangan Membina Dan Menyiapkan Politeknik Sandakan, Sandakan, Sabah Untuk Tetuan Kementerian Pengajian Tinggi Malaysia	Kementerian Pengajian Tinggi Malaysia	250.0 million	Construction Stage
28.	Cadangan Pembangunan Bercampur Pangsapuri Perkhidmatan Dan Perniagaan 25 Tingkat Yang Mengandungi 1 Blok Pangsapuri Perkhidmatan / Servis 20 Tingkat (260 Unit), Podium 5 Tingkat Terdiri Daripada Ruang Perniagaan 6 Unit, Tempat Letak Kereta 4 Tingkat, 'Roof Top Garden' Di Aras 4 & Aras Bumbung Dan Kemudahan Di Aras 4, 1 Unit Pondok Pengawal Di Atas Ptd 123407 (Lot 937460) & Ptd 123408 (Lot 93747) Mukim Pulai, Daerah Johor Bahru, Johor Untuk Tetuan Bmah Properties Sdn Bhd.	BMAH Prpoerties Sdn Bhd	25.0 milion	Construction Stage
29.	Merekabentuk, Membina, Menyiapkan Dan Menyelenggarakan 160 Unit (5 Tingkat) Rumah Pangsa Mampu Milik Dan Kerja-Kerja Berkaitan Dengannya Di Pulau Redang, Kuala Terengganu, Terengganu.	Kerajaan Terengganu	28,6 milion	Construction Stage
30.	Merekabentuk, Membina, Menyiapkan Dan Menyelenggarakan 200 Unit (5 Tingkat) Rumah Pangsa Mampu Milik Dan Kerja-Kerja Berkaitan Dengannya Di Pulau Perhentian, Besut, Terengganu.	Kerajaan Terengganu	33.4 milion	Construction Stage
31.	Cadangan Pembangunan Asrama Pelajar Yang Mengandungi 12 Blok Asrama Pelajar 5 Tingkat 1 Blok Bangunan Gunasama 2 Tingkat Yang Terdiri Daripada: Medan Selera, Pejabat Pentadbiran, Surau, Pusat Aktiviti Pelajar, 2 Unit Pondok Pengawal, 1 Unit Pencawang Tnb , 6 Unit Rumah Sampah Serta Kemudahan-Kemudahan Lain Di Atas Sebahagian Lot 2464, Mukim Padang Siding, Perlis Untuk Tetuan Universiti Malaysia Perlis (Unimap).	Universiti Malaysia Perlis (Unimap)	600.0 million	Construction Stage
32.	Cadangan Membina Projek Biosystem Universiti Kuala Lumpur (Unikl) Melaka	Majlis Amanah Rakyat Malaysia	80.0 million	Design Completed
33.	The Design, Construction, Completion, Equiping, Commissioning And Maintenance Of Tampin Hospital, Negeri Sembilan (108 Beds) – Gantian	Kementerian Kesihatan Malaysia	150.0 million	Design Completed

34.	Cadangan Pembangunan Perumahan (480 Unit Apartment Kos Sederhana) Di Atas Lot 1011, Bangi Selangor Darul Ehsan, Untuk Tetuan Syarikat Perumahan Negara.	Syarikat Perumahan Negara Berhad	70.0 million	Design Completed
35.	Cadangan Membina Penjara Termeloh, Pahah Pahang Untuk Jabatan Penjara Malaysia.	Kementerian Keselamatan Dalam Negeri, Malaysia	200.0 million	Design Completed
36.	Cadangan Rekabentuk Dalaman Ibu Pejabat Mara Kota Kinabalu	Majlis Amanah Rakyat Malaysia	1.5 million	Design Completed
37.	Cadangan Pembangunan Kediaman Mampu Milik (1 Tingkat Rumah Teres) Di Lot CL 165321666, Kg. Kallang, Sabah	LPPB & SPNB	30.0 million	Design Completed
38.	Cadangan Pelan Susunatur Pembangunan Semula Tapak Ciq Di Tanjung Puteri, Johor Bahru, Johor.	Impian Tulen Sdn. Bhd.		Design Completed
39.	Cadangan Pembangunan Kediaman Mampu Milik (1 Tingkat Rumah Teres) Di Lot CL 165319775), Kg. Uloi, Sabah	LPPB & SPNB	30.0 million	Design Completed
40.	Cadangan Pembangunan Kediaman Mampu Milik (1 Tingkat Rumah Teres) Di Daerah Ranau, Sabah	LPPB & SPNB	35.0 million	Design Completed
41.	Cadangan Pembangunan Kediaman Mampu Milik (2 Tingkat Rumah Teres) Di Sipitang, Sabah	LPPB & SPNB	25.0 million	Design Completed
42.	Cadangan Pembangunan Kediaman Mampu Milik (1 Tingkat Rumah Teres) di Lot LA91130729, Sook, Sabah	LPPB & SPNB	25.0 million	Design Completed
43.	Cadangan Pembangunan Kediaman Mampu Milik (1 Tingkat Rumah Teres) di Lot CL 135193529 & CL 135311938, Jalan Kg. Keningau, Keningau, Sabah	LPPB & SPNB	30.0 million	Design Completed
44.	Proposed Service Condominium on Lot 42, Jalan Nipah, Off Jalan Ampang Kuala Lumpur.	Ascenteus Holdings Sdn Bhd	30.0 million	Design Completed
45.	Cadangan Membina Dan Menyiapkan Rumah Teres 2 Tingkat 20' x 70' Dan Kedai Pejabat 2 & 3 Tingkat 22'x75' Di Senai Airport City, Mukim Tebrau, Daerah Johor Bahru, Johor Darul Takzim.	Enigma Harmoni Sdn. Bhd.	200.0 million	Design Completed
46.	Cadangan Pembangunan Kolej Pertanian Malaysia Bukit Tangga, Kedah Darul Aman.	Kementerian Pertanian & Industri Asas Tani Malaysia	600.0 million	Design Completed

47.	Cadangan Hotel Seri Malaysia Di Atas Lot 24682, Putrajaya.	Perembun (M) Sdn Bhd	25.0 million	Design Completed
48.	Cadangan Pembangunan Pusat Latihan Polis (PULAPOL) Di Tasek Pedu, Kedah Darul Aman.	Kementerian Dalam Negeri Malaysia	120.0 million	Design Completed
49.	Cadangan Pembinaan Ibu Pejabat Bomba Dan Penyelamat Negeri Wilayah Persekutuan Labuan, Sabah	Kementerian Dalam Negeri Malaysia	23.2 million	Design Completed
50.	Cadangan Meroboh Dan Pembangunan Semula Klinik Kesihatan Kuala Lumpur Yang Mengandungi: 1. 1 Blok Klinik Dua Tingkat 2. 1 Blok Setor Bahan Mudah Terbakar 3. 1 Blok Rumah Sampah 4. 1 Blok Pencawang TNB 5. 1 Blok Rumah Pengawal 6. 1 Blok Rumah Sistem Pendinginan Berserta Kemudahan Lain-Lain Di Atas Sebahagian Lot 151 Dan Lot 115, Jalan Fletcher, Mukim Bandar Kuala Lumpur, Daerah Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur.	Kementerian Kesihatan Malaysia	48.0 million	Design Completed
51.	Development Of Universiti Malaysia Sabah Teaching Hospital Through Public Private Partnership (Ppp)	Universiti Malaysia Sabah	652.0 million	Design Completed
52.	Cadangan Membina Dan Menyiapkan Sebuah Bengkel Membaikpulih Kapal Terbang (Hangar) Di Atas Sebahagian Lot No. Pt 16, Lapangan Terbang Antarabangsa Sepang (Klia), Selangor Darul Ehsan Untuk Tetuan Sepang Aircraft Engineering Sdn Bhd	Sepang Aircraft Engineering Sdn Bhd	72.0 million	Design Stage
53.	Proposed Mixed Development on Lot V27, Kota Kinabalu Industrial Park, Sabah (KKIP).	Inno Serangkai Sdn. Bhd.	200.0 million	Design Stage

CHAPTER 3

CASE STUDY

3.1 Introduction

Substructure for a building is defined as the structural work below ground level used to support the structure above. Foundations, basement, subfloor are some components of this substructure. The function of this substructure is to distribute loads of the structure over a large bearing area so as to bring intensity of loading within bearing area so as to bring intensity of loading within the safe bearing capacity of the soil lying underneath and to prevent the lateral movement of the supporting material. The design and selection of substructure for a building is depends on the total load of building, nature and bearing capacity of soil. This settlement is cause by the deformation of soils causing by an imposed load, volume changes of soil cause by seasonal conditions and mass movement of ground in an unstable area. The example of this substructure is foundation. Foundation is a structure which support the weight of upper structure and applies load. It is designed to transmits building load to the supportive soils or rock. This foundation can be divided into two type which is shallow foundation and deep foundation.

Shallow foundations are those founded near to the finished ground surface generally where the founding depth is less than the width of the footing and less than 3m. the example for shallow foundation are strip foundation, pad foundation, raft foundation and combined foundation. for strip foundation, it is used to support a line of loads either due to a load bearing wall, or a line of columns need supporting where column positions are so close that individual pad foundations would be inappropriate.

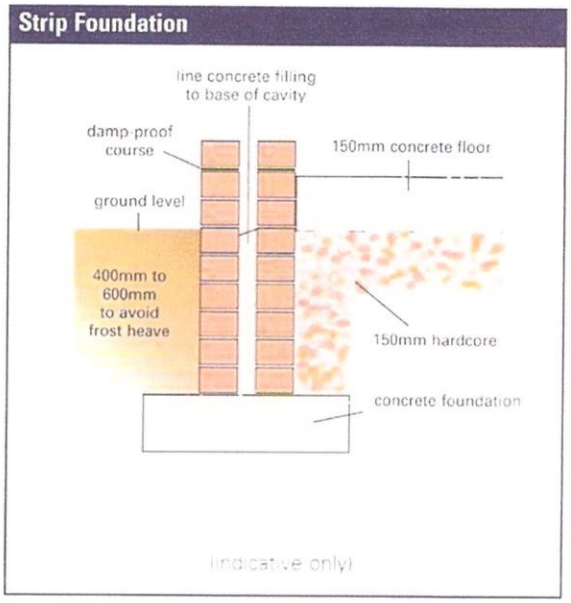


Figure 3.1.1 : Picture of strip foundation.

For pad foundation, it usually to support an individual point load such as that due to a structural column. They may be circular, square or rectangular. They usually consist of a block or slab of uniform thickness, but they may be stepped or hunched if they are required to spread the load from a heavy column. Pad foundations are usually shallow, but deep pad foundations can also be used.

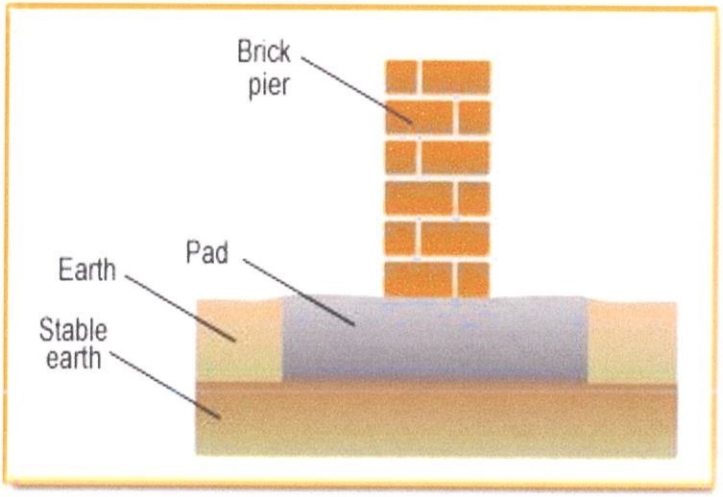


Figure 3.1.2 : Picture of pad foundation

Raft foundations are used to spread the load from a structure over a large area, normally the entire area of the structure. where the ground conditions are very poor and bearing power of the soil is low that the individual spread footing cannot be provided.

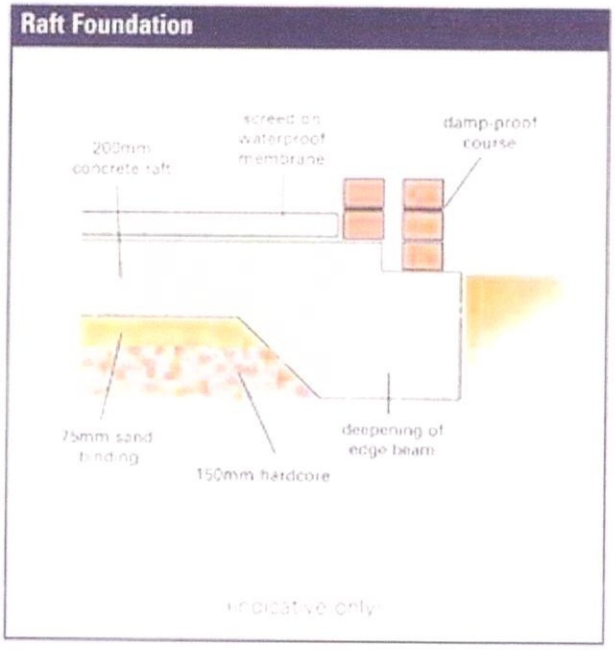


Figure 3.1.3 : Picture of Raft Foundation.

Deep foundations are foundations are those founding too deeply below the finished ground surface for their base bearing capacity to be affected by surface conditions, this is usually at depths 3 meters below finished ground level. The example of deep foundation is many but commonly used is pile foundation. Pile foundations are the part of a structure used to carry and transfer and transfer the load of the structure to the bearing of the structure to the bearing ground located at some depth below ground surface. The main components of the foundation are the pile cap and the piles. Piles are long and slender members which transfer the load to deeper soil or rock of high bearing capacity load to deeper soil or rock of high bearing capacity avoiding shallow soil of low bearing capacity. The main types of materials used for piles are Wood, steel and concrete.

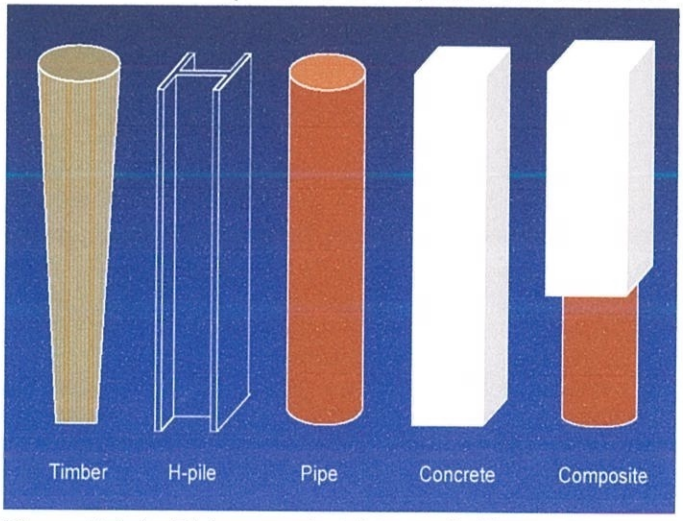


Figure 3.1.4 : Picture material type of piling.

3.2 Project background

TAJUK PROJEK : MEREKABENTUK, MEMBINA, MENYIAPKAN, MENYELENGGARA DAN MENTAULIAHKAN BAGI CADANGAN PEMBINAAN KLINIK KESIHATAN KUALA LUMPUR (REKA DAN BINA).

BUTIR-BUTIR KONTRAK

No Kontrak	: KK(S)-BPP.UPP/700-2/7/6/5
Pemilik	: KEMENTERIAN KESIHATAN MALAYSIA
Kontraktor Utama	: RD RESOURCES SDN BHD (599434-M)
Kontraktor Berdaftar	: CDB G7, PKK KELAS 'A' BUMIPUTERA
Harga Kontrak Asal	: RM47,996,090.90
Kaedah Perlaksanaan	: REKA DAN BINA
Tarikh Milik Tapak	: 15 JANUARI 2014
Tarikh Siap	: 12 JANUARI 2016
Tempoh Siap	: 24 BULAN
Tempoh Liabiliti Kecacatan (DLP)	: 24 BULAN
Workmen's Compensation (WC) Policy No	: 46-W0046139-WCA
	Contract Period : 15/01/2014 to 14/01/2016
Contractor's All risk (CAR) Policy No	: 46-E0047943-CAR
	Contractor Period : 15/01/2014 to 14/01/2016

PEGAWAI PROJEK

PENGARAH PROJEK (PD)	: KETUA SETIAUSAHA KKM
WAKIL PENGARAH PROJEK	: PENGARAH BAHAGIAN PERKHIDMATAN KEJURUTERAAN
KONTRAKTOR REKA & BINA	: RD RESOURCES SDN BHD

JURUPERUNDUNG PROJEK : Arkitek/Medical Equipment Planner

(ABDUL RAHMAN RICHARD ARCHTIECT)

Jurutera Sivil & Struktur

(ZARY ASSOCIATES)

Jurutera Mekanikal & Elektrikal

(PERUNDING ALIF BERSATU)

Jurukur Bahan

(KH ALLIANCE QUANTITY SURVEYOR SDN BHD)

3.3 Case study

In this project of Klinik Kesihatan Kuala Lumpur, piling is use as the substructure and foundation for this building. Piling is a post like foundation member used from prehistoric times. In modern civil engineering, piles of timber, steel, or concrete are driven into the ground to support a structure and bridge piers may be supported on groups of large-diameter piles. On unstable soils, piles are indispensable building supports and may also be used on stable ground when exceptionally large structural loads are involved. Piles are driven into the ground by pile drivers, machines consisting usually of a high frame with appliances for raising and dropping a pile hammer or for supporting and guiding a stream or air hammer. Piling can be classified with respect to load transmission and functional behavior which is End bearing piles (point bearing piles), Friction piles (cohesion piles) and Combination of friction and cohesion piles.

End bearing piles is a piles that transfer their load on to a firm stratum located at a considerable depth below the base of the structure and they derive most of their carrying capacity from the penetration resistance of the soil at the toe of the pile. The pile behaves as an ordinary column and should be designed as such. Even in weak soil a pile will not fail by buckling and this effect need only be considered if part of the pile is unsupported, i.e. if it is in either air or water. Load is transmitted to the soil through friction or cohesion. But sometimes, the soil surrounding the pile may adhere to the surface of the pile and causes "Negative Skin Friction" on the pile. This, sometimes have considerable effect on the capacity of the pile. Negative skin friction is caused by the drainage of the ground water and consolidation of the soil. The founding depth of the pile is influenced by the results of the site investigate on and soil test.

Friction or cohesion pile is carrying capacity is derived mainly from the adhesion or friction of the soil in contact with the shaft of the pile

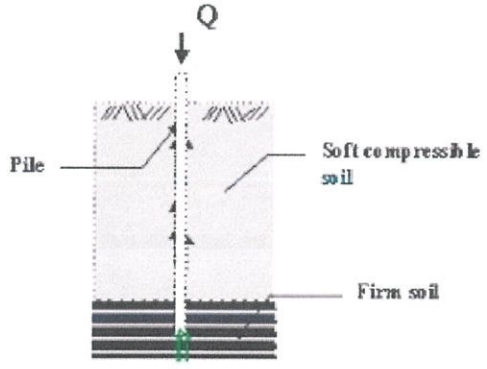


Figure 3.3.1:End bearing piles

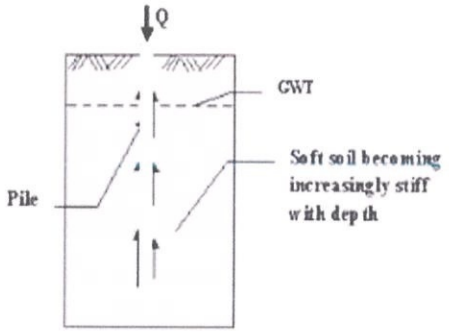


Figure 3.3.2:Friction or cohesion pile

Cohesion piles

These piles transmit most of their load to the soil through skin friction. This process of driving such piles close to each other in groups greatly reduces the porosity and compressibility of the soil within and around the groups. Therefore piles of this category are sometimes called compaction piles. During the process of driving the pile into the ground, the soil becomes molded and, as a result loses some of its strength. Therefore the pile is not able to transfer the exact amount of load which it is intended to immediately after it has been driven. Usually, the soil regains some of its strength three to five months after it has been driven.

Friction piles

These piles also transfer their load to the ground through skin friction. The process of driving such piles does not compact the soil appreciably. These types of pile foundations are commonly known as floating pile foundations.

Combination of friction and cohesion piles is an extension of the end bearing pile when the bearing stratum is not hard, such as firm clay. The pile is driven far enough into the lower material to develop adequate frictional resistance. A farther variation of the end bearing pile is piles with enlarged bearing areas. This is achieved by forcing a bulb of concrete into the soft stratum immediately above the firm layer to give an enlarged base. A similar effect is produced with bored piles by forming a large cone or bell at the bottom with a special reaming tool. Bored piles which are provided with a bell have a high tensile strength and can be used as tension piles.

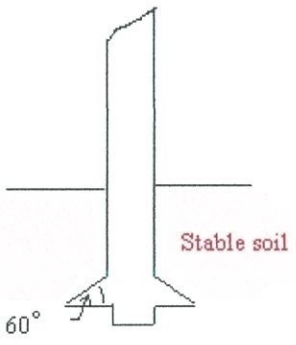


Figure 3.3.3 :under-reamed base enlargement to a bore-and-cast-in-situ pile

Piles are usually made of timber, concrete or steel. Timber can be used for the manufacture of temporary piles and when the wood is available at an economical price. Concrete is used for the

manufacture of pre-cast concrete piles, cast in place and pre-stressed concrete piles, while steel piles are used for permanent or temporary works.

Timber pile are Used from earliest record time and still used for permanent works in regions where timber is plentiful. Timber is most suitable for long cohesion piling and piling beneath embankments. The timber should be in a good condition and should not have been attacked by insects. For timber piles of length less than 14 meters, the diameter of the tip should be greater than 150 mm. If the length is greater than 18 meters a tip with a diameter of 125 mm is acceptable. It is essential that the timber is driven in the right direction and should not be driven into firm ground. As this can easily damage the pile. Keeping the timber below the ground water level will protect the timber against decay and putrefaction. To protect and strengthen the tip of the pile, timber piles can be provided with toe cover. Pressure creosoting is the usual method of protecting timber piles.

Table 3.3.1 : Advantages and disadvantages of Timber piles

ADVANTAGES	**DISADVANTAGES**
The piles are easy to handle	The piles will rot above the ground water level which have a limited bearing capacity
Relatively inexpensive where timber is plentiful	Can easily be damaged during driving by stones and boulders
Sections can be joined together and excess length easily removed	The piles are difficult to splice and are attacked by marine borers in salt water.

Concrete piles can be devided into two type which is pre-cast and cast in place concrete piles.

Pre-cast concrete piles is formed and reinforced in a high-quality controlled concrete, Usually used of square, triangle, circle or octagonal section, they are produced in short length in one meter intervals between 3 and 13 meters. They are pre-caste so that they can be easily connected together in order to reach to the required length. This will not decrease the design load capacity. Reinforcement is necessary within the pile to help withstand both handling and driving stresses. Pre stressed concrete piles are also used and are becoming more popular than the ordinary pre cast as less reinforcement is required.

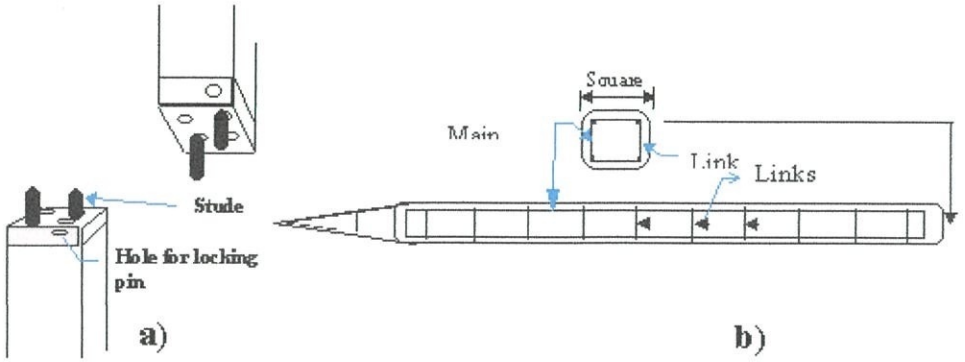


Figure 3.3.4 :a) concrete pile connecting detail. b) squared pre-cast concert pile

The Hercules type of pile joint is easily and accurately cast into the pile and is quickly and safely joined on site. They are made to accurate dimensional tolerances from high grade steels.

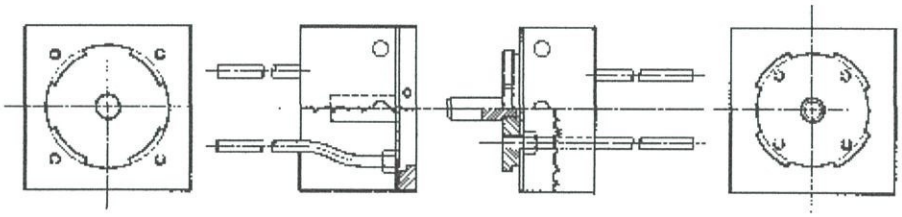


Figure 3.3.5 :Hercules type of pile join

Table 3.3.2 : Advantages and Disadvantages of pre-cast concrete piles.

ADVANTAGES	DISADVANTAGES
Are easy to splice and relatively inexpensive.	Displacement, heave, and disturbance of the soil during driving.
Stable in squeezing ground, for example, soft clays, silts and peats pile material can be inspected before piling.	Can be damaged during driving. Replacement piles may be required.

Can be driven in long lengths.	Cannot be driven with very large diameters or in condition of limited headroom.
Can increase the relative density of a granular founding stratum.	

Cast in concrete piles is the most type commonly used for foundations due to the great diversity available for pouring concrete and the introduction of the pile into the soil. Driving and drilling piles are two types of cast in place concrete piles; however, the implementation of these piles in place may be accompanied by some problems such as arching, squeezing and segregation.

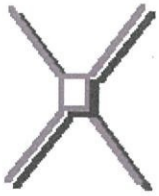
These piles had a different type of pile which is Simplex pile, Frankie pile, Vibro pile, Strong pile, under rimed pile, Strauss pile, Kimbersoil pile, Welfchauzer pile and Raymond pile.

Table 3.3.3 : Advantages and Disadvantages of cast-in concrete piles

ADVANTAGES	**DISADVANTAGES**
Can be inspected before casting can easily be cut or extended to the desired length.	Heave of neighboring ground surface, which could lead to re consolidation and the development of negative skin friction forces on piles.
Relatively inexpensive.	Tensile damage to unreinforced piles or piles consisting of green concrete, where forces at the toe have been sufficient to resist upward movements.
The piles can be cast before excavation.	Damage piles consisting of uncased or thinly cased green concrete due to the lateral forces set up in the soil. Concrete may be weakened if artesian flow pipes up shaft of piles when tube is withdrawn.
Pile lengths are readily adjustable.	Light steel section or Pre-cast concrete shells may be damaged or distorted by hard driving.

An enlarged base can be formed which can increase the relative density of a granular founding stratum leading to much higher end bearing capacity.	Cannot be driven where headroom is limited.
Reinforcement is not determined by the effects of handling or driving stresses.	Time consuming and cannot be used immediately after the installation.

Steel piles are made of sectors in the form of H, X or of thick pipes . They are suitable for handling and driving in long lengths. Their relatively small cross-sectional area combined with their high strength makes penetration easier in firm soil. They can be easily cut off or joined by welding. If the pile is driven into a soil with low pH value, then there is a risk of corrosion, but risk of corrosion is not as great as one might think. Although tar coating or cathodic protection can be employed in permanent works.It is common to allow for an amount of corrosion in design by simply over dimensioning the cross-sectional area of the steel pile. In this way the corrosion process can be prolonged up to 50 years. Normally the speed of corrosion is 0.2-0.5 mm/year and, in design, this value can be taken as 1mm/year.



a) X- cross-section

b) H – cross-section

c) steel pipe

Figure 3.3.6 : Steel piles cross-section

Table 3.3.4 : Advantages and Disadvantages of steel piles

ADVANTAGES	DISADVANTAGES
The piles are easy to handle and can easily be cut to desire length.	The piles are easily to corrode,
Can be driven through dense layers. The lateral displacement of the soil during driving is low (steel section H or I section piles) can be relatively easily spliced or bolted.	It will deviate relatively easy during driving.
Can be driven hard and in very long lengths.	relatively expensive because the material is steel.
Can carry heavy loads.	

In this site construction, they use pre-cast concrete as material for piling system. This is because this piling is easier to find in Kuala Lumpur area and the cost of this piling is more cheaper than using the steel piling. This strength of pre-cast concrete piling is strong and compatible with the soil condition in this area. This area contain hard ground, soft ground and moderate ground. This piling system also can reduce the project time because the system is simple and uses the concept of prefabricated.

Figure 3.3.7 : Picture of pre-cast piling in site construction (Klinik Kesihatan Kuala Lumpur)

to cultivate this piling, jack-in pile machine is used. Jack-in pile machine works for piling plant using "injection" method and not too noisy when compared with other peeling machines. This is due to the construction site environment surrounded by schools and public areas. They need an environment that is not disturbed by the noise produced by construction site. Therefore, this machine is suitable for use in addressing this problem.

Figure 3.3.8 : Picture of Jack-in pile in construction site (Klinik Kesihatan Kuala Lumpur)

Before piling works are carried out, the safety officer will conduct inspection of machines and safety must be observed. safety officer will also produce a form where the form he will confirm that the safety and inspection of piling machines have been complied with. in addition, he will also provide a description of the security that must be followed before and during piling works are carried out.

Table 3.3.5 : Inspection form before piling works started.

RD RESOURCES SDN. BHD.

HAZARD IDENTIFICATION, HAZARD ASSESMENT, RISK CONTROL (HIRARC)

Kontraktor	RD Resources Sdn Bhd	Disediakan oleh/Disahkan oleh	i)Radiezee b. Abd. Rahim / SSS ii)Teo Chin Yang / Piling Supervisor
Projek	Cadangan Merekabentuk,Membina,dan Menyiapkan bagi Kerja Menaik Taraf Tiga (3) Unit Loji Rawatan Sedia Ada (SAM024/SAM030/SAM194) B36 di kawasan Selangor	Disemak oleh	Nurhanif b. Mas / Safety Officer
		Diluluskan oleh	Raja Zulkarnain b. Raja Iskandar Shah / Project Manager
Aktiviti	Kerja-kerja "Jack In Pile"	Tarikh	26/8/2014

No	Aktiviti	Individu Yang Terlibat	Mengenalpasti Hazard	Penaksiran Risiko			Kawalan Risiko
			Hazard dan Bahaya	Kemungkinan	Keterukan	Nilai Risiko	Tindakan dan Saranan
1	Persediaan Sebelum Kerja Pemeriksaan terhadap jentera dan juga alat kelengkapan	a. Jurutera/Penyelia b. SHO/SSS c. Pekerja seruduk	a. Jentera tidak diperiksa dan diselenggara secara berkala *Potensi bahaya: Akan menyebabkan mesin rosak sekiranya tidak diselenggara dengan baik dan pekerja terdedah kepada bahaya.*	2	2	4	a. Toolbox Talk sebelum memulakan kerja & membuat pemeriksaan jentera b. Memeriksa buku log penyelenggaraan jentera PMA s/p operator serta alat yang akan digunakan ketika kerja-kerja piling c. Memaparkan PMA serta sijil operator jentera piling
2	i) Unloading jentera dari Low Loader ii) Pergerakan jentera berat seperti Low Loader Lori Truck ke tempat unloading jentera dan ke tempat kerja Piling yang akan di jalankan	a. Operator Mesin b. Pekerja seruduk c. Penyelia d. Signalman	a. Mesin tergelincir dari low loader ketika unloading *Potensi bahaya: Menyebabkan kerosakan kepada mesin dan peralatan serta membahayakan pekerja.* b. Pekerja terdedah kepada bahaya dilanggar kenderaan berat dan terperangkap di antara jentera ketika kerja unloading di jalankan *Potensi bahaya: Boleh mendatangkan kecederaan kepada pekerja dan kerosakan jentera*	3	3	9	a. Memberi toolbox talk sebelum kerja unloading jentera b. Menyediakan lalu/tempat yang rata dan selamat c. Pemantauan kerja-kerja unloading oleh penyelia d. Signalman perlu berhubung dengan operator ketika kerja-kerja unloading e. Memastikan operator yang bekerja merupakan individu yang terlatih f. Memastikan operator membawa kenderaan 25km/ di dalam kawasan projek. g. Signalman atau traffic controller perlu memastikan pergerakan jentera di dalam kawasan projek lancar
3	Membuat persediaan tapak ditempat kerja	a. Pekerja seruduk b. Penyelia	a. Permukaan yang licin dan tidak rata b. Binatang atau serangga yang berbisa *Potensi bahaya: Boleh menyebabkan tergelincir dan tersadung Boleh menyebabkan terkena gigitan oleh serangga berbisa.*	3	2	6	a. Membuat toolbox talk sebelum memulakan kerja b. Menyediakan akses yang selamat dan bebas dari halangan c. Memakai PPE yang sesuai setiap masa d. Memasang papan tanda keselamatan
5	Kerja mengangkat pemberat jentera untuk disesangkan pada jentera piling serta kerja mengangkat peralatan/pentas ke tempat kerja piling	a. Operator mesin b. Pekerja seruduk c. Signalman	a. Pekerja dihempap tersepit atau terhentak oleh muatan berat tergantung ketika kerja mengangkat di jalankan *Potensi bahaya: Akan menyebabkan kecederaan yang teruk dan kematian kepada pekerja*	3	4	12	a. Memastikan operator yang bekerja merupakan individu yang terlatih b. Signalman berkomunikasi dgn operator seperti menggunakan wiser c. Mantaukan kerja mengikut prosedur yang betul dan di pantau oleh penyelia. d. Memarang pekerja berada atau bekerja di bawah muatan tergantung
6	Jentera Piling bergerak dari satu tempat ke tempat kerja lain	a. Operator mesin b. Pekerja seruduk c. Signalman	a. Mesin atau jentera piling terbalik akibat ketidakrataan permukaan tanah dan permukaan tanah yang lembik *Potensi bahaya: Sekiranya berlaku akan mengakibatkan kecederaan dan kerosakan harta benda.*	1	3	3	a. Membuat/menyediakan permukaan tanah yang stabil dengan membuat kerja earthwork seperti memadat tanah sebelum kerja-kerja piling dijalankan b. Mesin Piling akan dikendalikan oleh orang yang kompetan/berkelayakan serta diawasi oleh pemsanhunya seperti signalman
7	Kerja-kerja pemetaan/mapping	a. Mapping personnel b. Penyelia dan juruteru c. Juruukur tanah	a. Letupan berpunca dari elektrik dan gas,kebakaran, kebocoran gas merbahaya, gangguan telekomunikasi serta pap ari pecah akan berlaku sekiranya kerja piling beroperasi sebelum kerja pemetaan/mapping untuk utiliti di dalam tanah dijalankan terlebih dahulu. *Potensi bahaya: Ini akan mengakibatkan kematian,kecederaan,kerosakan harta benda serta gangguan perkhidmatan dan telekomunikasi kepada orang ramai di sekeliling sekiranya sentuhan di antara concrete pile dan utiliti di dalam tanah terjadi (seperti sentuhan diantara kabel-kabel elektrik dan telekomunikasi pap-pap air dan gas) atas faktor kerja piling beroperasi sebelum kerja-kerja pemetaan dijalankan terlebih dahulu*	1	4	4	a. Mapping personnel dan THB memeriksa tapak projek samaada terdapat apa-apa utiliti di bawah tanah sebelum kerja-kerja piling bermula b. Juruukur tanah akan menunjukkan kawasan tempat kerja yang perlu diperiksa kepada mapping personnel c. Sebarang data atau kemungkinan akan dimaklum kepada penyelia dan juruteru di kawasan tapak

KEMUNGKINAN	KETERUKAN	NILAI RISIKO
1 Sangat tidak mungkin	1 Kecederaan yang boleh diabaikan	1-2 Rendah
2 Tidak mungkin	2 Kecederaan ringan	3-7 Sederhana
3 Mungkin	3 Kecederaan teruk	8-16 Tinggi
4 Sangat Mungkin	4 Kematian	

Nota:
Tindakan

Table 3.3.6 : Inspection form during piling works.

RD RESOURCES SDN. BHD.

HAZARD IDENTIFICATION, HAZARD ASSESMENT, RISK CONTROL (HIRARC)

Kontraktor	RD Resources Sdn Bhd	i)Disediakan ii)Dibantu oleh	i)Rafiezee b. Abd. Rahim / SSS ii)Teo Chin Yang / Piling Supervisor
Projek	Cadangan Merekabentuk,Membina,dan Menyiapkan bagi Kerja Menaik Taraf	Disemak oleh	Nurhanif b. Mas / Safety Officer
	Tiga (3) Unit Loji Rawatan Sedia Ada (SAM024/SAM030/SAM194) di kawasan Selangor	Diluluskan oleh	Raja Zulkarnain b. Raja Iskandar Shah / Project Manager
Aktiviti	Kerja-kerja "Jack in Piling"	Tarikh	26/8/2014

	Aktiviti	Individu Yang Terlibat	Mengenalpasti Hazard: Hazard dan Bahaya	Penaksiran Risiko: Kemungkinan	Keterukan	Nilai Risiko	Kawalan Risiko: Tindakan dan Saranan
	Operasi Semasa Kerja						
	Mesin/Jentera *Piling* sedang beroperasi	a. Operator Mesin b. Penyelia c. Pekerja cerucuk	a. Mesin *swing* tanpa pengawasan dari penyelia ketika kerja menanam cerucuk *Potensi bahaya: Pekerja terdedah kepada kecederaan akibat dari hentakan dari mesin ketika mesin berpusing.*	3	2	6	a. *Toolbox Talk* sebelum memulakan kerja & membuat pemeriksaan jentera b. Penyelia kerja *Piling* perlu memastikan pekerja am yang lain tidak berada berdekatan dengan jentera. c. Memastikan *swing alarm* mesin berfungsi sebelum kerja dijalankan
	Mesin/Jentera *Piling* mengangkat cerucuk	a. Operator Mesin b. Signalman c. Penyelia d. Pekerja cerucuk	a. Cerucuk/*Piling* terjatuh dan terkena pekerja ketika diangkat ke mesin *piling* disebabkan *sling wire* putus dan *shackle* rosak *Potensi bahaya: Pekerja akan mendapat kecederaan sekiranya tidak membuat pemeriksaan terhadap peralatan tersebut.*	3	3	9	a. Memeriksa peralatan seperti *sling wire* dan *shackle* yang digunakan setiap hari sebelum memulakan kerja. b. Kerja-kerja mengangkat sentiasa dibantu oleh penyelia atau juruterai. c. Kerja-kerja mengangkat perlu dilakukan dengan bantuan signalman bagi memastikan ianya dapat dilakukan dengan selamat.
	Mesin *Piling* mengepit dan menekan/menanam cerucuk	a. Pekerja cerucuk b. Penyelia c. Signalman	a. Serpihan batu dari cerucuk melayang terhasil daripada cerucuk yang patah akibat dari tekanan yang tinggi serta permukaan dalam tanah yang keras ketika proses menanam dijalankan. *Potensi bahaya: Serpihan batu melayang pada kelajuan yang tinggi akan mendatangkan kecederaan kepada pekerja sama ada kecederaan kecil atau besar*	3	2	6	a. Pekerja tidak dibenarkan berada berdekatan ketika kerja menanam cerucuk dijalankan. Jarak yang selamat sekurang-kurangnya 1m-2m dari mesin. b. Supervisor untuk kerja-kerja menanam cerucuk ini perlu sentiasa berhubung dengan operator seperti menggunakan wisel dan bahasa isyarat.
	Kerja -kerja kimpalan bagi penyambungan cerucuk	a. Pengimpal b. Operator mesin c. Penyelia	a. Kebakaran dan letupan *Potensi bahaya: Pengimpal boleh mendapat kecederaan dari percikan api kimpalan* *Letupan dan kebakaran boleh terhasil dari percikan api kimpalan dengan kebocoran minyak pada generator/mesin cerucuk sehingga boleh mengakibatkan kemalangan pada mesin dan kecederaan pada pekerja.*	3	3	9	a. Memeriksa peralatan mengimpal sebelum memulakan kerja kimpalan b. Memastikan pengimpal yang bekerja merupakan individu yang terlatih dan memakai PPE seperti *welding shield*, dan *welding gloves*. c. Operator perlu melakukan pemeriksaan pada mesin/jentera sebelum kerja bermula. d. Menyediakan alat pemadam api jenis ABC di mesin/jentera. e. Mendapatkan *PTW (Hot Work Permit)* untuk kerja kimpalan.
	Kerja -kerja memotong cerucuk menggunakan "diamond cutter"	a. Pekerja cerucuk b. Penyelia	a. Habuk berbahaya dan bunyi bising terhasil dari kerja pemotongan cerucuk. Tekanan yang berlebihan serta penggunaan mata pemotong yang tidak sesuai. *Potensi bahaya:* *a. Pekerja akan mendapat penyakit pada jangka masa panjang iaitu penyakit paru-paru pneumococis sekiranya terdedah kepada habuk yang terhasil dari pemotongan cerucuk.* *b. Pekerja mungkin akan hilang pendengaran sementara sekiranya terdedah kepada bunyi bising secara konsisten ketika kerja memotong cerucuk.* *c. Penggunaan mata pemotong yang tidak sesuai serta tekanan yang berlebihan mungkin akan menyebabkan mata pemotong patah dan mengakibatkan kecederaan kepada perkerja.*	3	3	9	a. Memastikan pemotong memakai PPE yang betul untuk kerja memotong seperti *Dust Mask, N95* dan *ear plug*. b. Memeriksa persatan pemotong seperti menggunakan mata pemotong yang sesuai mengikut rpm pada alat dan mata pemotong yang digunakan. c. Pekerja lain tidak boleh berada berdekatan melainkan mereka juga memakai PPE yang diperlukan ketika kerja pemotongan dijalankan. d. Menggunakan sistem penggiliran kepada pekerja bagi membuat kerja pemotongan cerucuk. e. Pekerja sentiasa berkomunikasi dengan supervisor setelah melakukan kerja pemotongan bagi memastikan mata pemotong masih boleh digunakan atau tidak.
12	Kerja-kerja mengambil data cerucuk / *Set for Pile* ketika kerja *piling* sedang beroperasi	a. Pekerja cerucuk b. Penyelia	a. Pekerja dihempap terhentak, atau tersepit diantara mesin ketika sedang mengambil data untuk *piling*. *Potensi bahaya: Akan menyebabkan kecederaan yang teruk dan kematian kepada pekerja*	3	4	12	a. Penyelia kerja *Piling* perlu memantau kerja set yang dilakukan serta sentiasa berkomunikasi dengan operator mesin. b. Memakai PPE seperti *safety helmet*, dan kasut bagi melindungi diri.

KEMUNGKINAN
1. Sangat tidak mungkin
2. Tidak mungkin
3. Mungkin
4. Sangat Mungkin

KETERUKAN
1. Kecederaan yang boleh diabaikan
2. Kecederaan ringan
3. Kecederaan teruk
4. Kematian

NILAI RISIKO
1 - 2 Rendah
3 - 7 Sederhana
8 - 16 Tinggi

A ZULKA
A ISKANI
ect Manag
Resources

Method statement for piling system

1) First of all the surveyor will control points, typically the building/block corner pegs are determined by the employer/client's licensed surveyor. The location of these points shall be sited at a place unlikely to be disturbed and are clearly marked using timber pegs with nail head to indicate the precise position of control point. Setting out pile positions would be where every pile position is pre-surveyed by the land surveyor with reference to the grid lines. The pile position will be pegged using a mild steel bar. In this site, there have 381 point of pile for the main building.

Figure 3.3.9 : surveyor doing the control point work using the tripod.

2) After the surveyor work is done, the jack-in pile will be checked before the piling work is continued. This checking work must be done with the safety officer approval and permission. The inspection form will be given from the safety officer which mean the machine is safely for use

Figure 3.3.10 : The safety officer is doing a checking for the piling machine.

3) When the checking process is completed, the pile will be inserted to the Jack-in system by using the on-board crane. The pile will be clamped and detached to the crane cable. Final vertical check and positioning by moving in the X and Y direction

Figure 3.3.11 : The workers was clamp the pile with the crane cable.

4) Commence jacking pile by applying jacking force onto the clamp device to press down the pile. When the jacking pile reaches certain depth and refuses penetration at the desired corresponding pressure, the pile may have set. If required, dolly may be used to jack-in excess pile length to below ground level.

Figure 3.3.12 : pile is forcing down to the ground by using the jack-in machine.

5) The 'set' of the pile is achieved when the jacking force is taken as 2.5 times the pile working load and is maintained for 30 seconds with residual settlement not more than 5mm

Figure 3.3.13 : the worker was measuring the depth of pile that has been forcing down until it reached the maximum penetration.

6) Once 'set' the extruding length of the pile shall either crushed by usage of a dolly and/or cut off by usage of a diamond cutter to facilitate movement of the machine. The pile is also being welded if they use more than1pile.

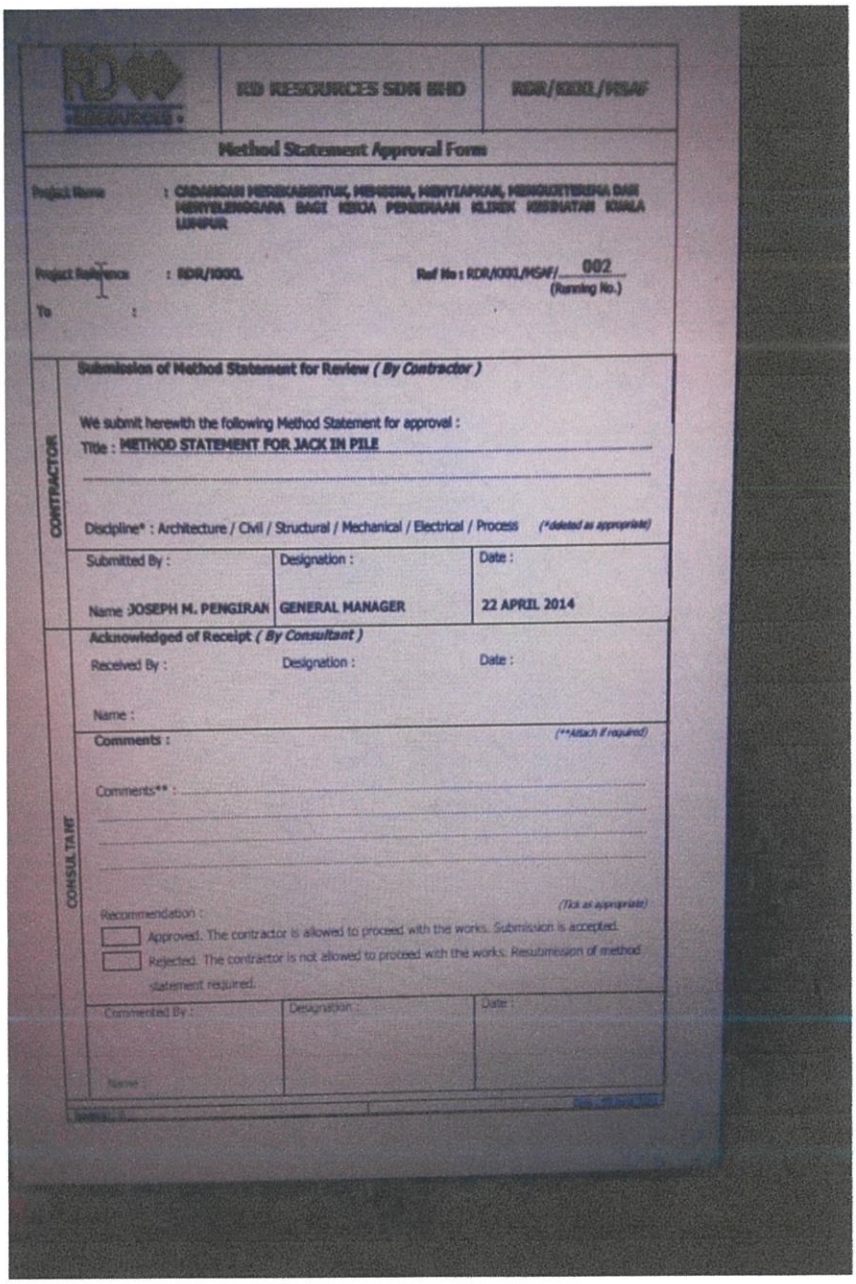
Figure 3.3.14 : The pile was being cut by the worker.

Figure 3.3.15 : the pile will be welding if the use of piling more than 1 in single point.

7) After the piling works is completed, the pile will be tested by using a load of steel that will be pushed down by jack-in pile machine and the result will be taken by the worker. This is because to test the strength of pile when it attached with the load.

Figure 3.3.16 : the worker taking the result and measure the strength of pile, if the pile cracked, then it will be remove and change with another pile

In construction industry, any kind of method statement must be formed by a paper sheet, this form was given by the company and must be filled if any work is going on that day. Lastly, a form of approval by contractor and client will be given.



RD RESOURCES SDN BHD | RDR/KKKL/MSAF

Method Statement Approval Form

Project Name : CADANGAN MEMBANGUNTUK, MENGUBA, MENYIAPKAN, MENGUJITERIMA DAN MENYELENGGARA BAGI KERJA PEMBINAAN KLINIK KESIHATAN KUALA LUMPUR

Project Reference : RDR/KKKL Ref No : RDR/KKKL/MSAF/ 002 (Running No.)

To :

CONTRACTOR

Submission of Method Statement for Review (By Contractor)

We submit herewith the following Method Statement for approval :

Title : METHOD STATEMENT FOR JACK IN PILE

Discipline* : Architecture / Civil / Structural / Mechanical / Electrical / Process (*deleted as appropriate)

Submitted By :	Designation :	Date :
Name :JOSEPH M. PENGIRAN	GENERAL MANAGER	22 APRIL 2014

CONSULTANT

Acknowledged of Receipt (By Consultant)

Received By : Designation : Date :

Name :

Comments : (**Attach if required)

Comments** :

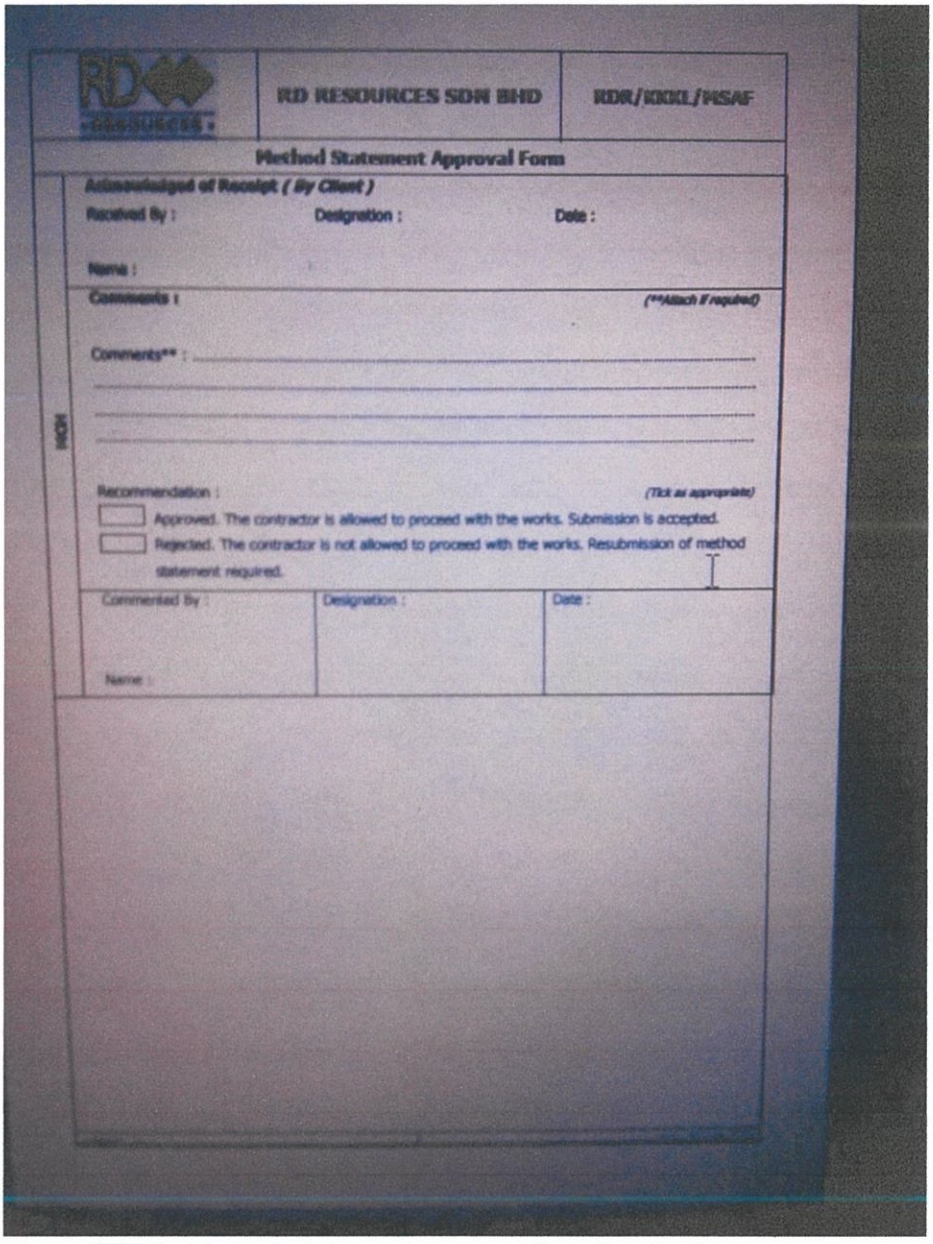
Recommendation : (Tick as appropriate)

☐ Approved. The contractor is allowed to proceed with the works. Submission is accepted.

☐ Rejected. The contractor is not allowed to proceed with the works. Resubmission of method statement required.

Commented By :	Designation :	Date :
Name :		

Figure 3.3.17 : method statement approval form for contractor



RD RESOURCES SDN BHD | RDR/KKKL/MSAF

Method Statement Approval Form

Acknowledged of Receipt (By Client)

Received By : Designation : Date :

Name :

Comments : (**Attach if required)

Comments** : .....

.....

.....

.....

Recommendation : (Tick as appropriate)

☐ Approved. The contractor is allowed to proceed with the works. Submission is accepted.

☐ Rejected. The contractor is not allowed to proceed with the works. Resubmission of method statement required.

Commented By :	Designation :	Date :
Name :		

Figure 3.3.18 : Method statement approval form for client.

CHAPTER 4

CONCLUSION AND RECOMMENDATION

In conclusion, in a period of 4 months given to practical training, I have gained a wealth of knowledge and guidance from all parties involved in the construction industry. I have learned ways to handle a project properly and in a timely manner. Besides that, I also can read construction drawings more carefully and learn how to use autocad software for completing the work plan layout drawings. Project Klinik Kesihatan Kuala Lumpur has also provided a lot of knowledge and information on the construction site. Not forget, thank also to the office staff that were always helpful and took the time to teach me without feeling tired. for the recommendation, I propose that the project of Klinik Kesihatan Kuala Lumpur incorporate more green elements of the building to the building even though the building is using some green building elements such as rain water harvesting system which recycles rainwater to be used as sprinkling water to plants around the building. This purpose is to save electricity costs. in addition, the temperature in the city is very hot. when using green building systems, the temperature in this area can be reduced slightly. some of the examples that can be used to make a building green building theme is by using photo-voltaic or better known as the solar system in the building. With this way, the use of electricity in a building can be saved and government will reduce expenses for the budget of this project as this project were handled by government as a client. the use of this system will also be easier because the concept of environmentally friendly and easy to do maintenance work and improvements in building.

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Internet

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2. http://www.qcon.ie/node/354

3. http://theconstructor.org/geotechnical/classification-of-piles/1799/

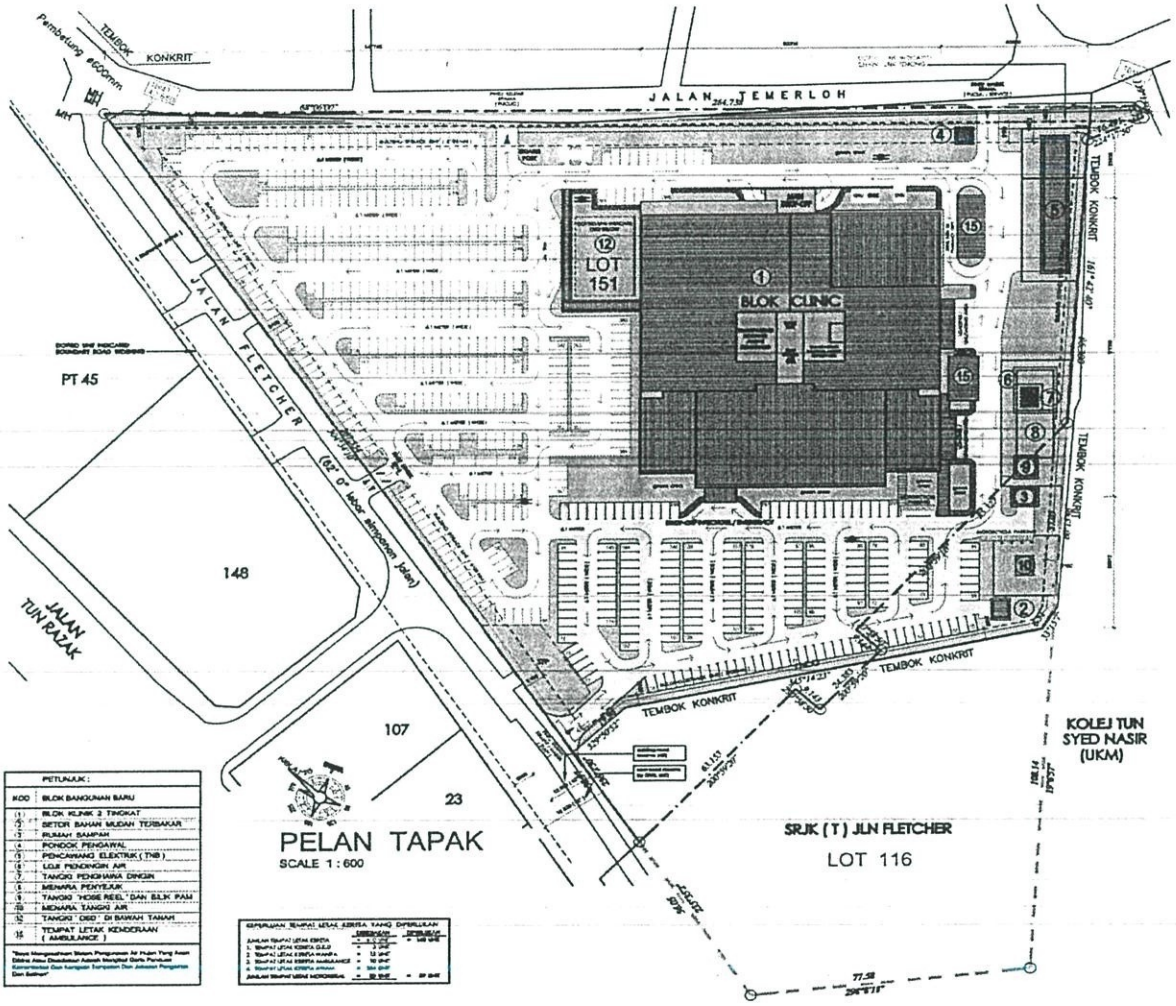
Other Source

1. Site Klinik Kesihatan Kuala Lumpur, Lot 151 dan Lot 116, Jalan Fletcher, Wilayah Persekutuan Kuala Lumpur.

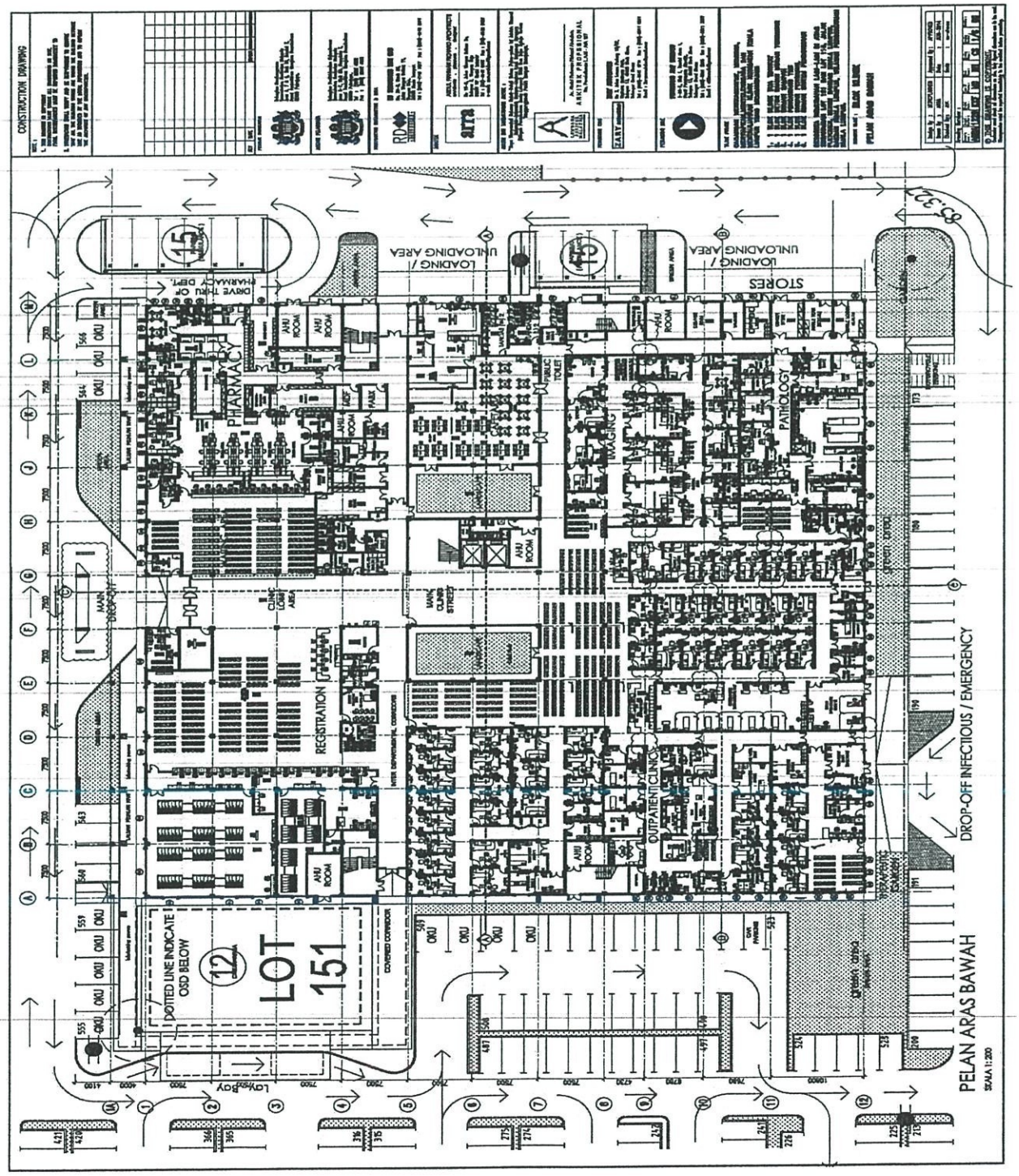
2. Abdul Rahman Richard Arkitek, No 19-2, Jalan Wangsa Delima 2A, Seksyen 5, Wangsa Maju, 53300, Kuala Lumpur

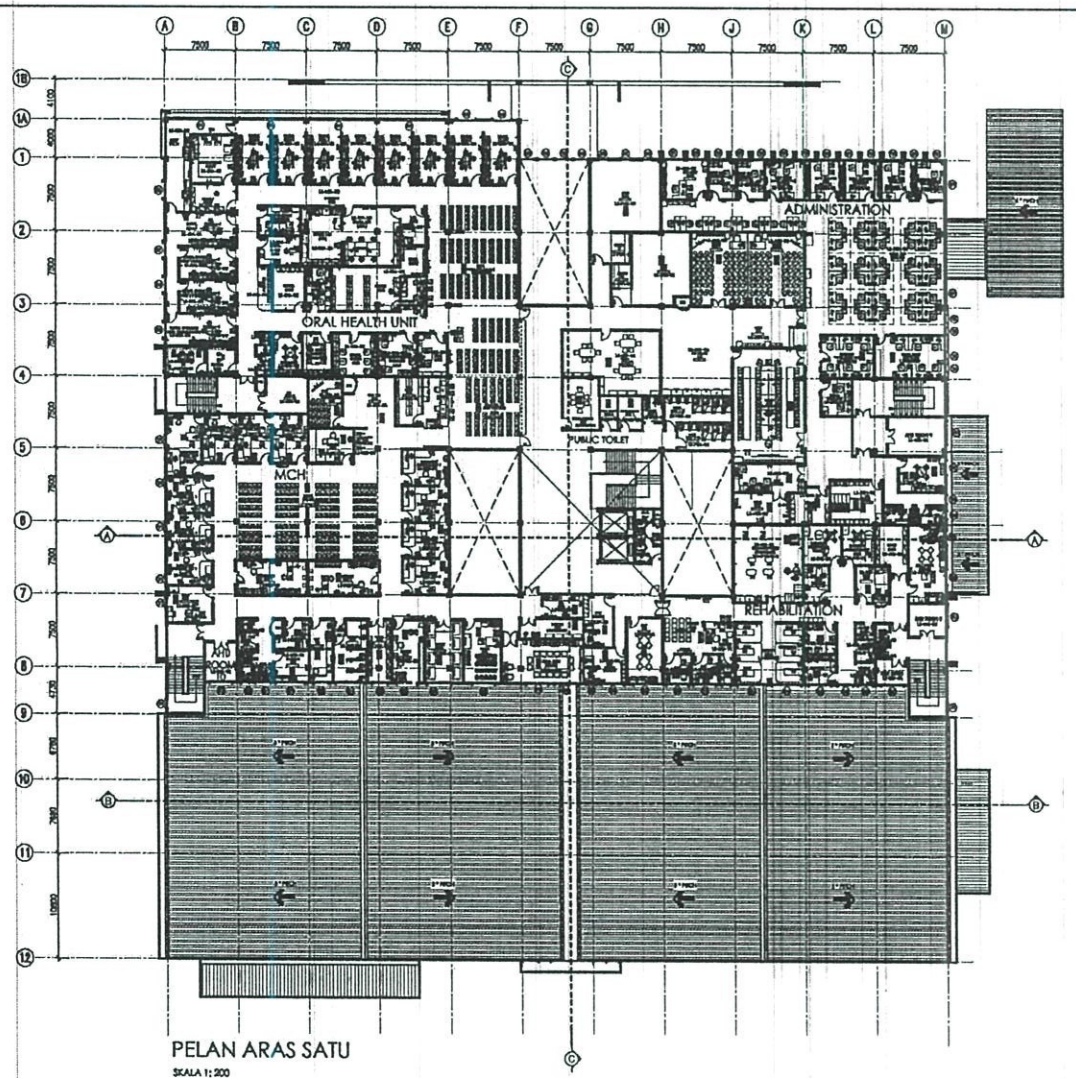
3. RD Resource SDN. BHD, No 30-3, Block 3C, Jalan Wangsa Delima 11, Wangsa Link, 53300, Kuala Lumpur.
   P

Appendix A : Project layout Plan



Appendix B : Typical Floor Plan





PELAN ARAS SATU

SKALA 1: 200

CONSTRUCTION DRAWING

PELAN ARAS SATU

RD RESOURCES

MEREKABENTUK, MEMBINA, MENYIAPKAN, MENYELENGGARA DAN MENTAULIAHKAN BAGI CADANGAN PEMBINAAN KLINIK KESIHATAN KUALA LUMPUR (REKA DAN BINA)

DETAILS FINANCIAL S-CURVE

Item	Description	Total Elemental Cost (RM)	2014 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	2015 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	2016 JAN
1	Preliminary																										
	a Consultant fees	3,836,000.00	2,261,000.00	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	58,333.30	116,666.60	175,000.35	58,333.53	58,333.53
	b Supervision	564,000.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	23,500.00	11,750.00	11,750.00
	c Contractors -Supervision	925,000.00	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	38,541.67	19,270.83	19,270.83
	d Plant & Machineries	2,575,000.00	381,025.00	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	95,390.20	47,695.30	47,695.30
2	Piling Works	1,990,914.00			298,637.10	298,637.10	1,393,639.80																				
3	Earthworks	935,200.00			233,800.00	233,800.00	467,600.00																				
4	Building Works																										
	a Main Building	12,025,399.10						459,805.45	459,805.45	459,805.45	459,805.45	26,584.90	26,584.90	186,982.90	695,992.54	863,816.02	1,307,238.82	1,423,019.62	1,609,337.59	1,292,319.25	1,504,098.02	939,977.43	310,425.31				
	i) IBS	3,200,637.30								1,168,784.89	1,168,784.89	359,038.45	359,038.45	144,990.62													
	b Guard House	30,524.50																						11,700.50	18,824.00		
	c TNB Sub-Station	229,649.90										45,466.70	45,466.70	45,466.70	45,266.50	47,983.30											
5	Infrastructure Works																										
	a Water Supply System	286,148.80														47,696.00	47,697.00	47,697.00	47,697.00	47,697.00	47,664.80						
	b Sewerage Reticulation	459,527.80														10,005.90	80,572.00	80,572.00	80,572.00	80,572.00	80,572.00	46,661.90					
	c Roadworks & Drainage System	2,998,899.90														437,557.00	437,558.20	111,332.70	411,332.70	411,332.70	411,332.70	411,332.70	300,000.40	67,120.80			
	d Fencing & Gate	241,494.00																	52,902.50	52,902.50	52,902.50	52,902.50	29,884.00				
	e Children Playground	37,600.00																							37,600.00		
	f Detention Pond	380,000.00																				130,000.00	130,000.00	120,000.00			
	g Landscape & Covered Walkway	105,062.50																			5,833.00	35,833.00	35,833.00	27,563.50			
	h Car Park	37,841.00																17,500.00	17,500.00	2,841.00							
	i Elevated Water Tank	185,000.00														46,250.00	46,250.00	46,250.00	46,250.00								
	j Rumah Sampah	25,000.00																	9,642.50	9,642.50	5,715.00						
6	Mechanical Works																										
	a Aircond	4,398,500.00									66,834.50	81,827.50	82,087.50	117,087.50	542,412.50	579,912.50	579,912.50	684,858.00	566,710.00	492,645.00	251,125.00	198,500.00	117,087.50	37,500.00			
	b fire Protection	605,850.00													22,125.00	52,125.00	72,125.00	122,125.00	102,125.00	83,187.50	78,850.00	41,593.75	31,593.75				
	c Plumbing	694,050.00									82,626.00	27,542.00	27,542.00	27,542.00	137,707.30	137,707.30	137,707.40	27,542.00	27,542.00	27,542.00	33,050.00							
	d Lift	630,000.00																50,000.00	250,000.00	250,000.00	80,000.00						
	e LPG	89,250.00																		42,500.00	46,750.00						
	f Building Supervisory System	794,944.60											42,292.00	72,292.00	72,292.00	83,389.00	157,100.00	119,450.00	231,854.60	16,275.00							
	g Pneumatic Tube System	104,422.50																9,945.00	29,835.00	39,780.00	24,862.50						
	h Others	11,500.00																		11,500.00							
7	Electrical Works																										
	a Equipment for Medium Voltage	749,632.00												20,200.00	202,000.00	202,000.00	202,000.00	183,800.00									
	b Conduit & Cabling	578,700.00									18,225.10	45,225.00	45,225.00	45,225.00	45,225.00	45,225.00	45,225.00	36,225.00	36,225.00	36,225.00	36,225.00	36,225.00						
	c Swithboard	426,000.00													142,000.00	142,000.00	142,000.00										
	d Wiring	200,150.00																									
	e Fitting	673,050.00											56,037.60	56,037.60	56,037.60	56,037.60	56,037.60	56,037.60	56,037.60	56,037.60	56,037.60	56,037.60					
	f Lighthing Protection System	243,540.00																	81,180.00	81,180.00	81,180.00	81,180.00					
	g Genset	245,160.00																		61,290.00	61,290.00	61,290.00	61,290.00	61,290.00			
	h ELV System	1,211,971.00																		60,598.55	60,598.55	60,598.55	60,598.55	60,598.55			
	i Telecomunication Sysytem	230,472.00																		57,618.00	57,618.00	57,618.00	57,618.00	57,618.00			
8	Maintenance	240,000.00																									240,000.00
9	Provisional Sum	4,800,000.00																	200,000.00	800,000.00	800,000.00	800,000.00	800,000.00	800,000.00	800,000.00		
	Contract Amount	47,996,090.90																									
	SCHEDULE MONTHLY CLAIM (RM)		2,704,066.67	215,765.17	748,202.27	748,202.27	2,077,004.97	675,570.62	675,570.62	1,844,355.51	2,152,041.01	804,449.72	897,039.32	895,231.09	2,083,665.21	3,001,911.39	3,418,262.29	3,223,327.36	4,182,799.42	4,371,445.65	4,113,959.42	3,513,739.72	2,723,878.79	1,422,846.93	988,856.22	137,049.66	377,049.66
	SCHEDULE CUMULATIVE CLAIM (RM)		2,704,066.67	2,919,831.83	3,668,034.10	4,416,236.37	6,493,241.33	7,168,811.95	7,844,382.57	9,688,738.07	11,840,779.08	12,645,228.80	13,542,268.11	14,437,499.20	16,521,164.41	19,523,075.80	22,941,338.09	26,164,665.44	30,347,464.87	34,718,910.51	38,832,869.93	42,346,609.64	45,070,488.43	46,493,135.37	47,481,991.58	47,619,041.24	47,996,090.90
	SCHEDULE CUMULATIVE CLAIM (%)		6%	6%	8%	9%	14%	15%	16%	20%	25%	26%	28%	30%	34%	41%	48%	55%	63%	72%	81%	88%	94%	97%	99%	99%	100%
	ACTUAL MONTHLY CLAIM (RM)		-	-	-	2,510,880.41	1,274,203.57																				
	ACTUAL CUMULATIVE CLAIM (RM)		-	-	-	2,510,880.41	3,785,083.98																				
	ACTUAL CUMULATIVE CLAIM (%)		0%	0%	0%	5%	8%																				