UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITI TEKNOLOGI MARA

(PERAK)

SEPTEMBER 2014

It is recommended that the report of this practical training provided

By

MOHAMAD HAKIM BIN MOHAMAD HATTA

2012817366

Entitled

CONSTRUCTION OF SUBSTRUCTURE

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

Report Supervisor	En. Muhammad Naim Mahyuddin
Practical Training Coordinator:	Pn. Wan Nordiana Wan Ali
Faculty Coordinator	Dr. Mohd Rofdzi Bin Abdullah

DEPARTMENT OF BUILDING

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(PERAK)

MAY 2014

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 Mega Indah Construction, Kuala Terengganu, for duration of 4 months starting from 12 May 2014 and ended 29 September 2014. It is submitted as one of the prerequisite requirements of DBN307 and accepted as a partial fulfilment of the requirements for obtaining the Diploma in Building.

Name : MOHAMAD HAKIM BIN MOHAMAD HATTA

UiTM ID No : 2012817366

Date : 29 September 2014

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LIST OF ABBREVIATIONS

UBBL Ubniform Building By – Law

UiTM Universiti Teknologi Mara

CIDB Construction Industry Development Board

CHAPTER 1

INTRODUCTION

1.1 Substructure

The structure of the building is divided into two parts. The sub-structure and the super structure. The lower portion of the building which transmits the load of the super structure to the foundation soil is called sub-structure and the portion of the building which is above the substructure is called super structure. The weight of superstructure is borne by the foundation hence the foundation should be strong enough to carry the load of the super structure.

The foundation of sub-structure distributes the load of the building evenly on thesoil in such a way that at not below the foundation the soil pressure exceeds the maximum allowable bearing capacity of soil. It helps in strengthening the building against the lateral forces caused due to tornado, earthquake and etc. It provides strong surface for the construction of proposed structure. To provide safety to the structure from flow of water and seepage.

All structure has its own load that need to be supported by the ground. Every structural work needs to begin with the construction of substructure. Substructure refers to all parts of construction members that built below the ground level or below. Substructure work includes piling work, foundation, column stump, underground floor and foundation base floor.

1.2 Objective Reports

In this case study objective of this practical training report is to identify more precisely and must be taken seriously for the students to make practical report on how Substructure work process. There are two objectives:

1. Identify and understanding the equipment, machineries and material used in completing substructure work
2. Identify and study how the substructure work is done from the foundation is built until floor slab.

1.3 Scope of Report

Scope of study for this report is focuses on methodology of how the substructure work is done. Besides getting more knowledge on profile function, tools needed and material used to complete the whole step of constructions.The safety at the site also should be concern in site

Therefore, this scope of study is done only under project named, Mega Indah Construction, which is to "Proposed & Developed the Process Plant & Warehouse of Dairy Factory" is located at D-1076 Kampung Pulau Rusa, 20050 Kuala Terengganu, Terengganu Darul Iman.

1.4 Methodology

Before starting the research, I have identified a several methods that will be used for me to obtain information in details. Therefore, I have used several methods to complete this practical report. Many methodology had been used to ensure this report completed, one of the method are:

I. Observations

This project is developed a "2 storey bungalow" at Taman Chendering Utama. This project is one of the biggest project for Mega indah construction Bina Sdn Bhd. Therefore, reconnaissance is needed to ensure all the details work are supervised properly. Pictures is taken for this report to showing the precise work of substructure work from foundation until done the floor slab/ground floor. Some of the pictures are about tools, machineries, components and any other elements for substructure work. Observation is a method to obtain information through the observation of the work done at site. I have visited the site to investigate how the workers perform their skill and method in construct the substructure, with my own observations have given me a lot of knowledge, information and how to install it.

II. Interview sessions.

Interview was carried orally methods to obtain information. Through the interview method, I have interviewed several workers to get information. In addition, interview the project manager or site supervisor to get more information about this case study

2.3 Company Profile

2.3.1 Objective

To provide infrastructure and public utilities specifically road, water supply, building airport, port and base to meet the needs of national development with always focuses on: -

i. Long-time as soon as possible.
ii. Economical cost.
iii. Appearance and quality of the best.

2.3.2 Mission

Mega Indah Construction mission is to contribute to national development by: -

i. Help our customers realize the policy information and deliver services through collaboration as a strategic partner.
ii. Providing asset management services and effective and innovative projects.
iii. We strive to provide a better quality of life for our employees.
iv. Strengthen existing engineering competency.
v. Develop human capital and new competencies.
vi. Upholding integrity in service.
vii. Build a harmonious relationship with the community.
viii. Preserving the environment in service delivery.

2.3.3 Vision

To become a world-class service providers and centers of excellence in the field of asset management, project management and engineering for the infrastructure development based on human capital and the creative and innovative technology.

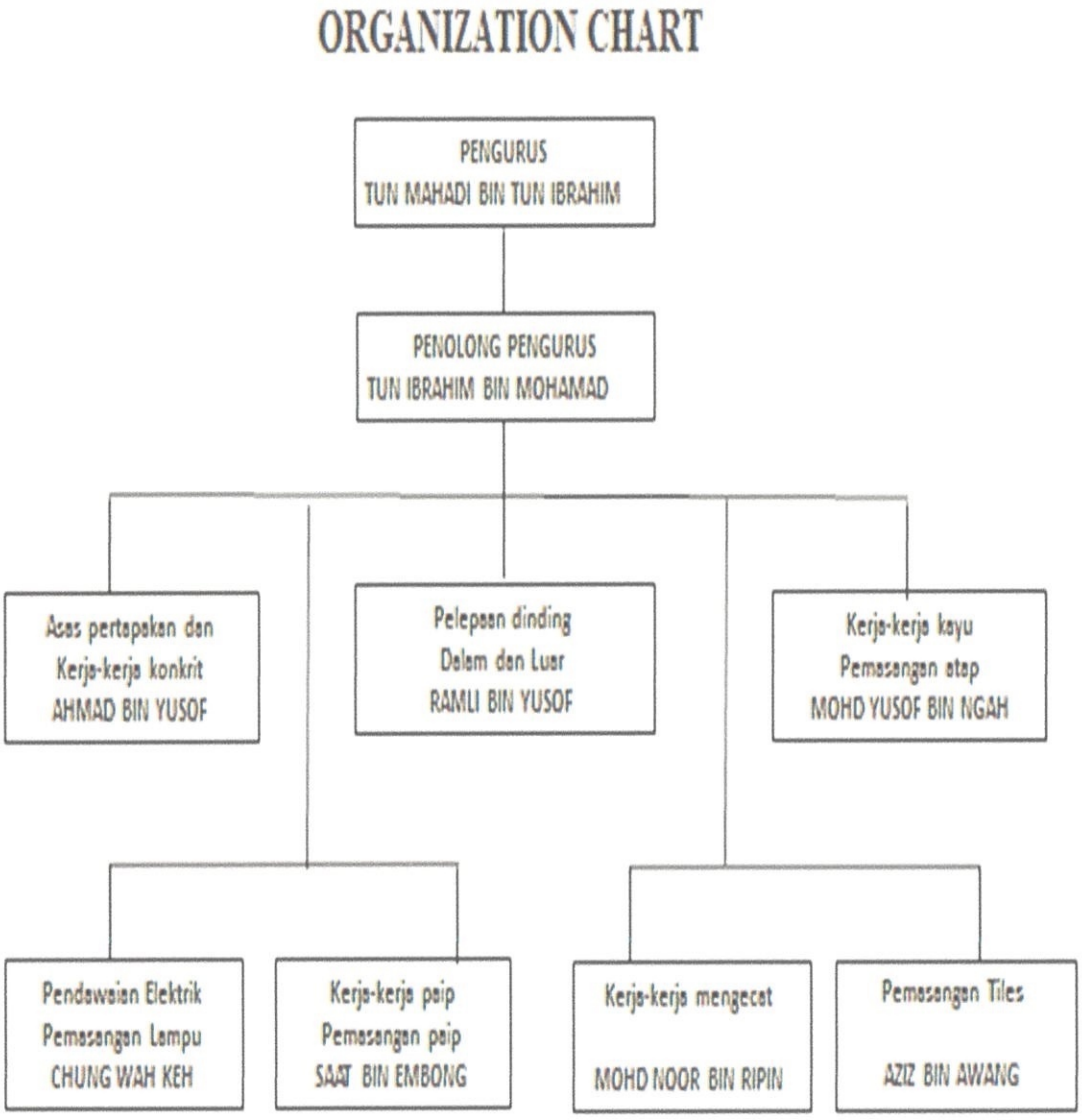
2.3.4 Function of Department

Functions of the department are: -

i. Planning, inspection, design and implement the infrastructure.
ii. Undertake infrastructure where necessary.
iii. Maintenance of infrastructure.
iv. Advising on technical matters to the government, local authorities and statutory bodies.

2.4 Organization Chart

2.4.1 Chart



2.5 List Of Project

BIL	HOUSE	KU * or SK	CLIENT NAME AND ADRESS	COST OF PROJECT (RM)	DATE OF START	DATE COMPLETES	PERCENT OF DONE
1	1 storey house	KU	Kamarudin b Mohd 349 Kg Pulau Rusa 20050 K Terengganu SPPI :66729/2009/02	250,000.00	11.11.2009	21.03.2011	100%
2	1 storey house	KU	Ruhil Anikah bt Ibrahim 19 Jalan Masjid Raja Bukit Besar, 21110 K Terengganu SSPI : 53630/2010/04	220,000.00	25.01.2010	06.01.2011	100%
3	1 storey house	KU	Azizah bt Mohd Salleh No. 75 D Kg Tajin Kuala Berang 21700 Hulu TRG SSPI :517790/2010/02	280,000.00	01.04.2010	01.04.2011	100%
4	1 storey house	KU	Noriah bt Endut PBC-15/1 Kg Pengkalan Berangan 21040 K Terengganu SSPI: 58060/2010/02	180,000.00	02.06.2010	08.07.2011	100%
5	1 storey house	KU	w. Norkhamisah bt Wan Mohamad 3016C Jalan Kem Seb. Takir 21300 K. Terengganu SSPI : 60207/2010/02	240,000.00	21.07.2010	07.07.2011	100%
6	1 storey house	KU	Asmak bt Yusoff B 603 Kg Beladau Kolam Manir, 21200 K Terengganu SSPI : 51227/2006/04	350,000.00	03.10.2010	12.12.2011	100%
7	2 storey house	KU	Saifuddin Bin Mustaffa D 918 Kg Pulau Rusa 20050 Kuala trg PERSENDIRIAN	108 000.00	20.02.2011	29.11.2011	100%
8	2 storey house	KU	Rahima Bt Ramli D 219 Kg Pulau Rusa 20050 Kuala Trg Terengganu SPPI : 55357/2011/04	280 000.00	03.03.2011	04.12.2011	100%
9	1 storey	KU	Osman Bin Mohd N0 210 kg Tualang Manir	238 000.00	22.03.2011	25.03.2012	100%

	house		21200 Kuala Terengganu, trg Bank Muamalat Ruj : RAC/KTNU/HF/BBA/1105				
10	1 storey house	KU	Rozila Bt Ahmad K4-2-204, Blok K Apartment Sri Menanti Persiaran Sri Menanti Bdr Sri Damansara 52200 KL	258 000.00	27.03.2011	12.06.2012	100%
11	1 storey house	KU	Abd Rahim bin Jusoh No 88-1 Projek Perumahan Kg.Losong Megat Hussin 21000 Kuala Terengganu PERSENDIRIAN	201 500.00	13.06.2011	10.04.2012	100%
12	1 storey house	KU	Kasmawati Bt Daud SK Slim River 35800 Slim River Perak Ruj : PPI 62611/2011/02	240 000.00	12.07.2011	18.07.2012	100%
13	2 storey house	KU	Wan noordiran Bt W Long Lot PT 272-P, Taman Selesa, Wakaf Mempelam 20050 K Terengganu Ruj : BSN/BN/TRG/BBA/88/2012	475 000.00	09.02.2012	09.12.2012	100%
14	1 storey house	KU	Samsidah Bt Ismail 915 KG Sg Rengas 20050 K Terengganu PERSENDIRIAN	230 000.00	20.02.2012	21.01.2013	100%
15	1 storey house	KU	Ishak Bt Ghani No D 25 Kg Pualau Rusa 20050 K Terengganu Ruj: PPI 63681/2012/02	360000.00	12.06.2012	07.05.2013	100%
16	2 storey house	KU	Wan Shahrin B Wan Mustaffa 5740/7, Jalan Alur Damat Wakaf Tengah 21030 K. Terengganu Ruj : CIMB M 12130200087	580 000.00	10.07.2012	11.11.2013	100 %
17	2 storey house	KU	Saripah Bt Embong Sek. Men Imtiaz Kuala Trg 20050 Kuala Terengganu	250 00.00	30.07.2012	15.11.2013	100%

			Terengganu Ruj : PPI 67677/2012/02				

2.5.2 Current Project

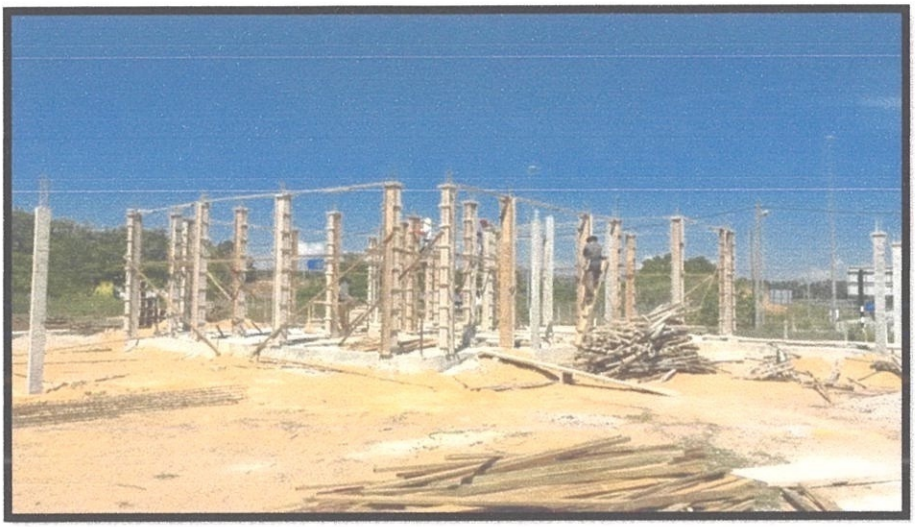
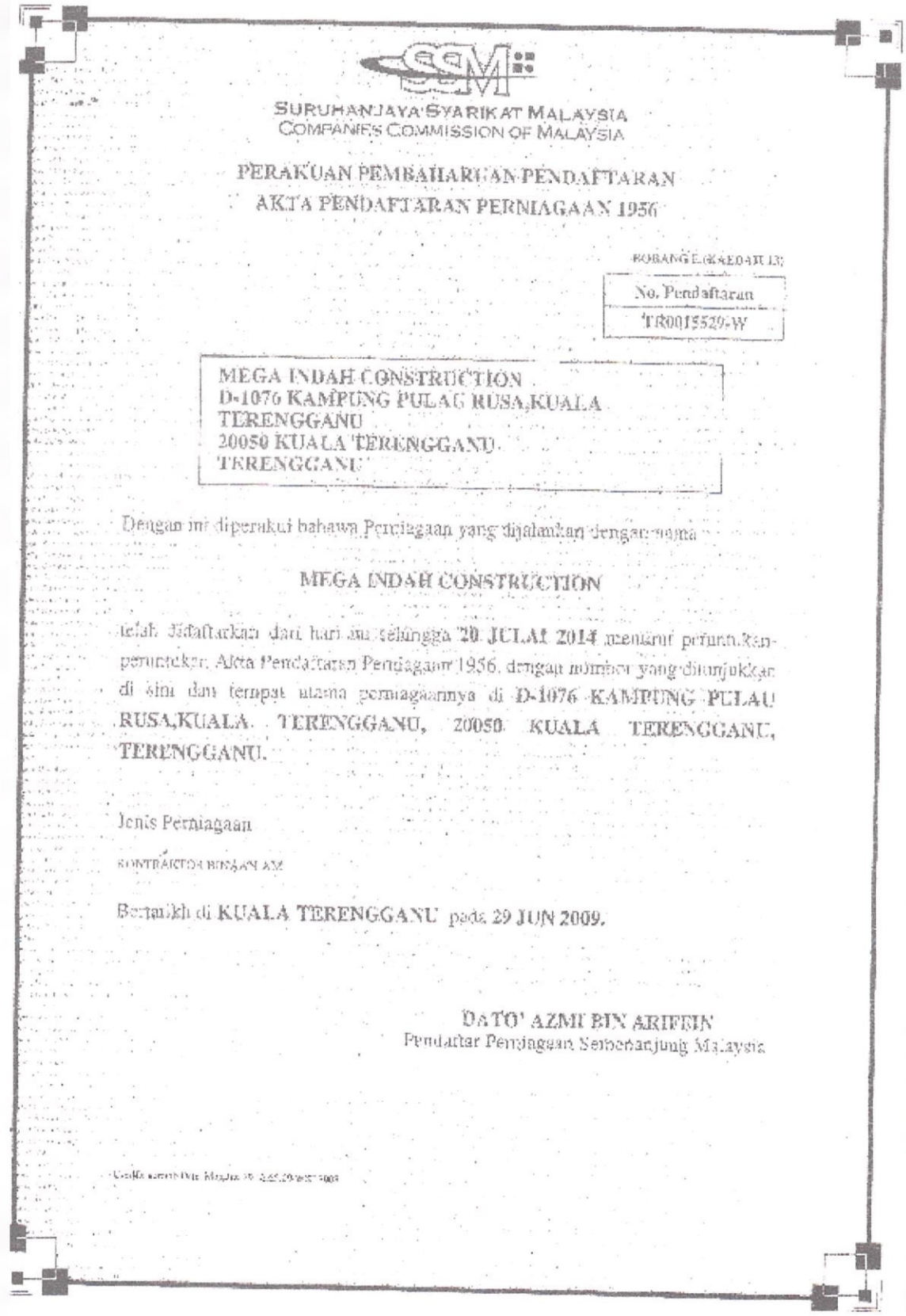


Photo 2.3 1 storey bungalow, Kampung Serada, 40% in progress

Photo 2.4 1 storey bungalow, kampung Padang Machang, 70 % in progress

2.6 Certificate of company



SURUHANJAYA SYARIKAT MALAYSIA
COMPANIES COMMISSION OF MALAYSIA

PERAKUAN PEMBAHARUAN PENDAFTARAN
AKTA PENDAFTARAN PERNIAGAAN 1956

BORANG E (KAEDAH 13)

No. Pendaftaran
TR0015529-W

MEGA INDAH CONSTRUCTION
D-1076 KAMPUNG PULAU RUSA,KUALA
TERENGGANU
20050 KUALA TERENGGANU
TERENGGANU

Dengan ini diperakui bahawa Perniagaan yang dijalankan dengan nama

MEGA INDAH CONSTRUCTION

telah didaftarkan dari hari ini sehingga **20 JULAI 2014** mengikut peruntukan-peruntukan Akta Pendaftaran Perniagaan 1956, dengan nombor yang ditunjukkan di sini dan tempat utama perniagaannya di **D-1076 KAMPUNG PULAU RUSA,KUALA TERENGGANU, 20050 KUALA TERENGGANU, TERENGGANU.**

Jenis Perniagaan

KONTRAKTOR BINAAN AM

Bertarikh di **KUALA TERENGGANU** pada **29 JUN 2009.**

DATO' AZMI BIN ARIFFIN
Pendaftar Perniagaan Semenanjung Malaysia

127361 A

PERAKUAN PENDAFTARAN

Adalah dengan ini diperakui bahawa kontraktor yang dinyatakan di bawah ini telah berdaftar dengan Lembaga mengikut Bahagian VI Akta Lembaga Pembangunan Industri Pembinaan Malaysia 1994. Pendaftaran ini adalah tertakluk kepada syarat-syarat yang telah ditetapkan di belakang Perakuan ini

No Pendaftaran: 1981220-TR050186

Nama Kontraktor : MEGA INDAH CONSTRUCTION

Alamat Berdaftar : D-1076, KAMPUNG PULAU RUSA
20050 KUALA TERENGGANU
TERENGGANU

Gred, kategori dan pengkhususan berdaftar

G3	B	B04 B13 B14
G3	CE	CE21

Tarikh Mula Berkuatkuasa : 01 JAN 2014

Tarikh Tamat Tempoh Perakuan : 31 DEC 2016*

*Perakuan ini hendaklah diperbaharui sekurat kurangnya 60 hari sebelum tarikh tamat tempoh

STATUS : AKTIF - Kontraktor yang diawardkan projek semasa perakuan pendaftaran ini dikeluarkan.

(AHMAD FARRIN BIN MOKHTAR)
b.p. Ketua Eksekutif

Bertarikh: 01 JAN 2014

NO PENDAFTARAN : 1991220-PR0050186

MEGA INOAH CONSTRUCTION

0-1078, KAMPUNG PULAU RUSA

TERENGGANU

Pendaftaran Dengan Lembaga

Pendaftaran dengan lembaga adalah bagi Gred, Kategori dan Pengkhususan seperti di bawah ini

Gred		Kategori		Pengkhususan	
G3	Tidak melebihi RM1,000,000	B	PEMBINAAN BANGUNAN	B04	KERJA AM BANGUNAN
				B13	PEMASANGAN JUBIN DAN KERJA LEPAAN
				B14	KERJA-KERJA CAT
G3	Tidak melebihi RM1,000,000	CE	PEMBINAAN KEJURUTERAAN AWAM	CE21	KERJA-KERJA AM KEJURUTERAAN AWAM

SURUHANJAYA SYARIKAT MALAYSIA
COMPANIES COMMISSION OF MALAYSIA

PERHATIAN : SUNGGUHPUN SEGALA USAHA TELAH DIAMBIL UNTUK MEMASTIKAN MAKLUMAT YANG DIBERI ADALAH BETUL DAN KEMASKINI PENDAFTAR PERNIAGAAN TIDAK BOLEH DIPERTANGGUNGKAN BAGI SEBARANG KERUGIAN KERANA MAKLUMAT YANG TERSILAP ATAU TERTINGGAL

** MAKLUMAT PERNIAGAAN **

NAMA PERNIAGAAN	: MEGA INDAH CONSTRUCTION
ALAMAT UTAMA PERNIAGAAN	: D-1076 KAMPUNG PULAU RUSA,KUALA TERENGGANU 20050 KUALA TERENGGANU TERENGGANU
NO PENDAFTARAN PERNIAGAAN	: TR0015529-W
TARIKH MULA BERNIAGA	: 15-07-1997
TARIKH MULA DIDAFTARKAN	: 21-07-1997
TARIKH PENAMATAN PERNIAGAAN	:
TARIKH PERUBAHAN	: 20-08-1997
TEMPOH LUPUT PERAKUAN PENDAFTARAN SEKARANG	: 20-07-20[illegible]
BENTUK PERNIAGAAN	: PERKONGSIAN

** JENIS PERNIAGAAN **

KONTRAKTOR BINAAN AM

** MAKLUMAT CAWANGAN **

*** TIADA CAWANGAN ***

[illegible]

TINGKAT 6-7, MENARA YAYASAN ISLAM, JALAN SULTAN OMAR, 20300 KUALA TERENGGANU, TERENGGANU, MALAYSIA.
Tel : 09-623 7170 / 09-623 7127 Fax : 09-623 0945

CHAPTER 3

CONSTRUCTION OF SUBSTRUCTURE

2.1 INTRODUCTION

Sub-structure generally refers to those components of the building that are constructed below ground, although there are circumstances when sub-structure can also include components above ground such as supporting columns on steeply sloping ground. Barry's Introduction to Construction of Buildings (Emmit and Gorse 2005:37) defines the foundation of a building as "that part of walls, piers and columns in direct contact with, and transmitting loads to, the ground." For purposes of this chapter sub-structure includes only those components constructed below ground.

Sub-structure components

Construction activities and components included in the term sub-structure include excavations, foundations, foundations walls, and ground floor slabs. These components are described here within the context of sustainable construction, and do not include structural or other technical contexts. For the structural requirements refer to the National Building Regulations Parts B, G, H, J and K.

2.2 BACKGROUND OF THE PROJECT

This study describes the whole method to construct a substructure of the bungalow and the plant used in the construction of substructure. In Malaysia, there are many stage in constructions house or building which start from excavation, setting out the site and until it finishes, but in this case study only focused on the ways of construction a substructure woks which generally refers to those components of the building that are constructed below ground, that located in LOT 3561, kawasan Kubang Ikan, Mukim Cenering, Daerah Kuala Terengganu, for Mrs Dayana Binti Ab Manan. The project site is near to the PUSPAKOM and Istana Syarqiyyah. In addition, this study also focuses on the plant used to construct a substructure and also describes the conclusions and recommendations of the construction a substructure work.

Substructures are include the foundation, stump ,ground beam and ground floor slab.In this observation, the writter will know the methods of constructions of substructure of a bungalow 2 storey. The method of constructions substructure of high rise building compare to the bungalow are different.

3.3 Case Study

Sub-structure generally refers to those components of the building that are constructed below ground, although there are circumstances when sub-structure can also include components above ground such as supporting columns on steeply sloping ground. Barry's Introduction to Construction of Buildings (Emmit and Gorse 2005:37) defines the foundation of a building as "that part of walls, piers and columns in direct contact with, and transmitting loads to, the ground." For purposes of this chapter sub-structure includes only those components constructed below ground

Foundations

Typically foundations are cast to a depth and a width required by the nature of the building and the site. Typically foundations for a residential buildings of not more than 2 storeys are 600 mm wide, 230 mm thick, and are cast about 500 mm below natural ground level.

Foundation walls

Once the concrete in the foundations has set, foundation walls are constructed up to the desired level of the ground floor slab. Depending on the nature of the site, this may require a substantially high wall, for example, on sloping sites. Foundation walls may be built from concrete (either cast or in masonry form) or in clay bricks

3.3.1 Step 1 :Setting Out

Firstly, method the construction of a substructure or building is setting out. Setting out is the establishment of the marks and lines to determine the position and extent of the elements for the construction of a building. In the work of setting out, there are a few of tools that should be used, such as, yarn. In the construction of the Substructure of building, first thing that must be determined is the length, width and depth of the footing that required. In this project, the size of foundation need to be setting out is 3m x 3m', and the depth of swimming pool is about 4 feet. There are three parties will be involved in the work of setting out, such as, employers, engineers and contractors. Engineers will examine the work of setting out to do, but that will be responsible for the contractor. Purpose of setting out to get the actual dimension of foundation before start the excavation works.

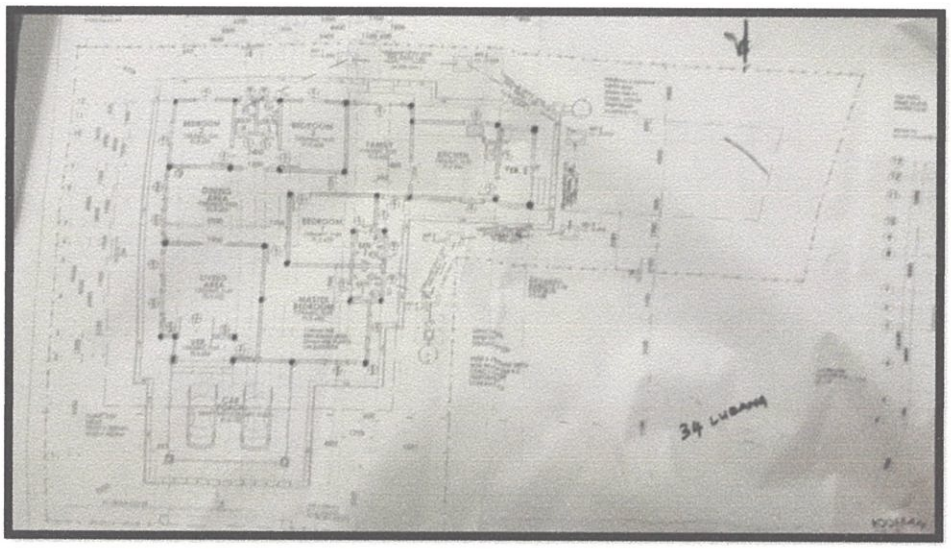


Photo 3.1 Floor plan

3.3.2 Step 2 : Excavations

The depth and width of excavations is determined by the structure and size of the building it supports and also the nature and bearing capacity of the ground supporting it. Ground, as defined in Barry's Introduction to Construction of Buildings (Emmitt and Gorse 2005:37) is the general term used for the Earth's surface, which varies in composition within the two main groups: rocks and soils. Generally excavated material is used for backfilling once the foundation walls are constructed unless the soil type is unsuitable. Where excavation takes place in soil it is important to remove the turf and vegetable topsoil and to set this aside for future use on the site. The carting away of topsoil should not be permitted.

3.3.3 Step 3 :The Foundation process

- **The installation of frame reinforcement**
  The usually size of hole that will be do footing is 1m x 1m x 1m.But there are many size of the hole.The frame of reinforcement are already be tide.The workers just cut the frame with suitable size that matching with the hole of the footing that will be installed. The workers are installed the frame of reinforcement with size 3mx3m. A lots of workers are needed in installation of the reinforcement.

Photo 3.2 The installation of the frame reinforcement

Photo 3.3 The frame of reinforcement are completed installed in the hole.

- **The concrete are being pour in the hole after installation of reinforcement**
  The grade of concrete that usually use for make footing is 20 or 25.The grade of concrete are affect the stability,strength and the stiffness of foundation.This important to maintain the stability of building after the construction completed. The concrete are brought by using crane which facilite the workers to install the concrete in the hole.
  The workers are prepared to install the concrete into the hole.The concrete that will install into the hole about 2 feet from above.

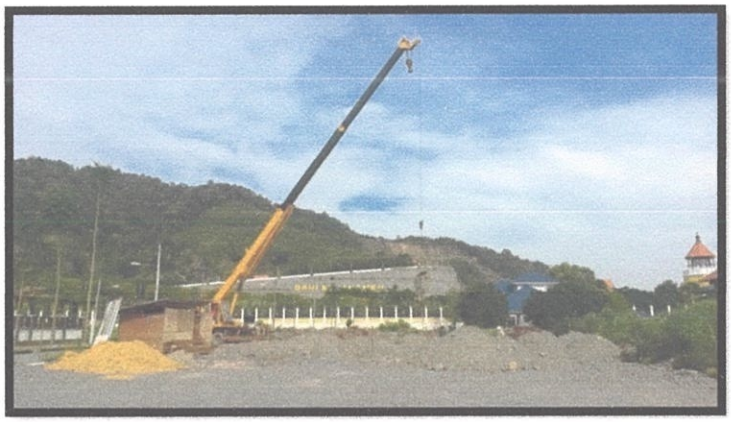


Photo 3.4 The concrete are brought by using crane

Photo 3.5 The workers are prepared to install the concrete into the hole.

Photo 3.6 The grade of concrete that use for the foundation is grade 25

3.3.4 Step 4 : Column Stump

Column stump is a column that considered as lower structure because it is located in the ground below the waterproof layer at ground floor slab. The position is vertical above the foundation. The function of the column stump is to transfer load of building to the foundation. Column stump will receive load from ground beam and column and then will transfer the load to the foundation. The columns can be made from steel tube; pre cast concrete or treated timber these need to be designed by an engineer for correct sizing.

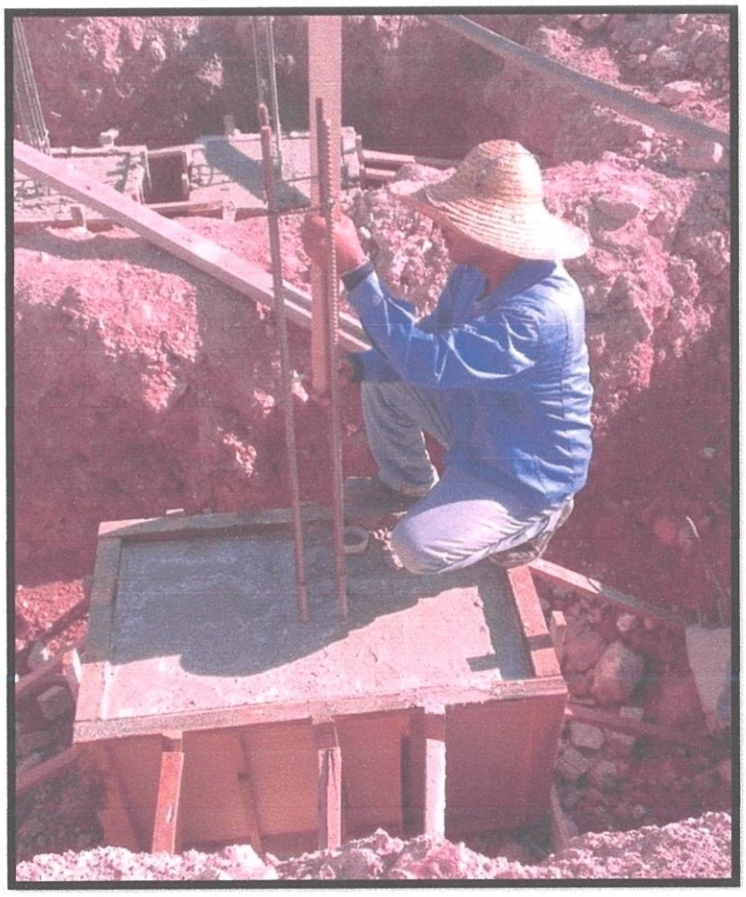


Photo 3.7 A worker marked the level of the column stump and ground beam

3.3.5 Step 5 :Ground Beam

The ground beam construction will be started after a column stump has finish. After the column stump has ingrained in foundation and has corpulent on level as wanted. Beam framework will put and pointed stake set in the ground with tidy so that look tough and strength. Strength of framework is important to ensure that framework not expand when a concrete will instill. If framework not good, its will give a problem and the construction work have much time. After that, link concrete is lain out on ground surface into the framework. The reinforcements will be putted with spacer block on below and beside reinforcement. Purpose that putted the spacer block is to protect the reinforcement for avoid from rus

In construction, slab can be design in two conditions.First condition- is built when the ground is good enough to carry the load from the building. In this condition, the slab is designed to carry the load of the building with the help from the ground support.Second condition- is building when the ground is not good enough to carry the load from the building. In this condition, the slab is design just like the floor of upper floor that can carry the load without the help from the ground support. In this case, more cost is needed.

There is several function of ground slab

- To support column and stump
- To received the load from the building
- To reduce the pressure on the column and stump
- The main base of construction to ensure that the construction will done well
- Create the easier job on floor finishes

The construction of a solid ground slab floor can be considered less than three heading

- Hardcore
- Binding
- Concrete bed or slab

Photo 3.10 The formwork for ground beam are ready to install

Photo 3.11 Lean concrete is poured before concreting

Photo 3.12 The reinforcement for groundbeam

3.3.6 Step 6 :Installation of Reinforcement Bars

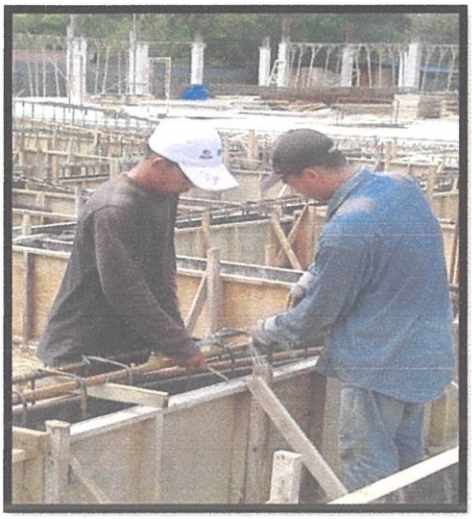


Photo 3.13 Installation of reinforcement bars for ground beam at site

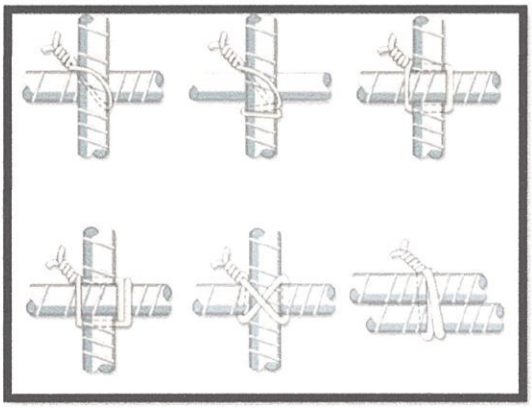


Photo 3.14 Types to tie wire to the reinforcement bars.

Source: Des Molloy, Freelance Technical Writer, Golden Bay

(10st September 2013)

Mostly all types to tie wire to the reinforcement have been used at site SK King Edward because from my observation, they have its own tie according to the connection of the reinforcement bars. Sometimes, the labours that take responsibility to install the reinforcement bars do not take serious about the tie of wire ties. They just make sure the wire tight to reinforcement bars

3.3.7 Step 7 :Inspection of Reinforcement Bars

Photo 3.15 The inspection of reinforcement bars done by En Fakhrulrazi, building engineer.

Reinforcement bars installation must be done before for the concreting the ground beams. And before that, the engineer of the building has been visiting to ensure the order of the reinforcement bars in the correct arrangement follow the drawing. The inspection had been detected the incorrect of the installation of reinforcement bars. So, they cannot continue to the other stages of construction, that a concrete work. This happen because the arrangement of reinforcement bars is incorrect. En. Fakhrulrazi amend the arrangement by told the site supervisor to rearrange.

3.3.8 Step 8 :Installation of Formwork (external)

Photo 3.16 External formwork for groundbeam

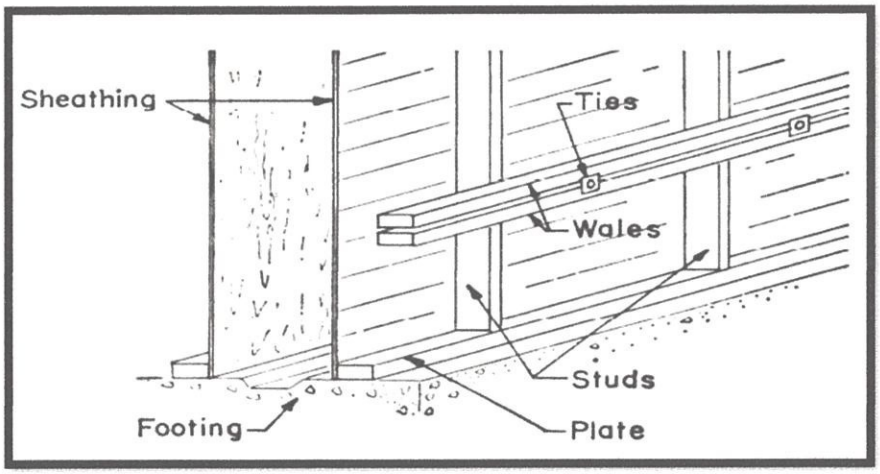


Photo 3.17 An example illustration of structure of formwork.

3.3.9 Step 9 : Concrete Work

Photo 3.18 Process pouring the concrete into formwork.

Grade for concrete beam is following the specifications set by Gred35 JKR. The common dealers follow specification batching set. Concrete has been poured two twice to speed up the curing process. Firstly labours just pour half of the formwork. As usual, the concrete must pass the slump test and cube test. The number of cube test made following the volume of the concrete work on that day. The cube test carry out on 7^{th}, 14^{th} and 21^{st} days.

Concrete from the lorry mixer has been pour into the bucket that carry by mobile crane and the driver control the bucket to area that need to concrete. Labours receive the bucket and push near into the formwork. After that, they control the bucket for make the concrete flow out into the formwork.

Concrete work not complete if the labours do not vibrate the concret
main function of this is to make the concrete flow in formwork and avoid from honeycomb. The concrete fulfill all part of formwork when vibrated. The concrete work continued by to the other area for fulfill the formwork around the area.

Photo 3.19 The concrete had been completely done installed

Photo 3.20 The formwork were opened and groundbeam had done

3.3.10 Step 10 : Installation of underground plumbing

The next step in building a home is installing the underground plumbing. The plumbers start at the sewer lateral that comes under the footing from the street and slope it upwards to all the areas that plumbing is necessary like the utility room, bathrooms, kitchen, etc. It is common to only put in the drains under ground and after the home is framed the water supply lines will be installed. After all the drains are installed the plumber will either put water in the pipes or put a pressure gauge on the top of one of the drains. All the other line ends will be capped and then after a little time the water or gauge will be checked to make sure there is no loss. This ensures that there are no leaks in the lines.The plumbing lines must be covered with sand or small gravel. No large stones that could puncture the pipes are allowed.

Before a project starts, determine the responsibilities for specific work of the plumber, the main contractor and the electrician.Discuss the location of pipe runs with the main contractor to minimise cutting or notching of framing.

Photo 3.21 The installations of pipes

Photo 3.22 underground plumbing for the furnace utility room.

General installation requirements

Pipework must:

- comply with the durability requirements of Building Code clause B2 *Durability*
- be compatible with the support
- be installed to allow for thermal movement
- be protected from freezing by insulation, or being buried below the level of freezing
- be protected from damage
- be wrapped in flexible material or sleeved when penetrating masonry or concrete

3.3.11 Step 11 : Concrete slab (floor Slab)

A concrete slab may be prefabricated or in situ. Prefabricated concrete slabs are built in a factory and transported to the site, ready to be lowered into place between steel or concrete beams. They may be pre-stressed (in the factory), post-stressed (on site), or unstressed. It is vital that the supporting structure is built to the correct dimensions, or the slabs may not fit.

In situ concrete slabs are built on the building site using formwork - a type of boxing into which the wet concrete is poured. If the slab is to be reinforced, the rebars are positioned within the formwork before the concrete is poured in. Plastic tipped metal, or plastic bar chairs are used to hold the rebar away from the bottom and sides of the form-work, so that when the concrete sets it completely envelops the reinforcement. For a ground slab, the form-work may consist only of sidewalls pushed into the ground. For a suspended slab, the form-work is shaped like a tray, often supported by a temporary scaffold until the concrete sets.

The formwork is commonly built from wooden planks and boards, plastic, or steel. On commercial building sites today, plastic and steel are more common as they save labour. On low-budget sites, for instance when laying a concrete garden path, wooden planks are very common. After the concrete has set the wood may be removed, or left there permanently.

In some cases formwork is not necessary - for instance, a ground slab surrounded by brick or block foundation walls, where the walls act as the sides of the tray and hardcore acts as the base.

3.3.12 Step 12: Ground Floor constructions method

- **Concrete Slab**
  One of the oldest methods for constructing a ground floor has to be the concrete slab. This method is simple and fairly inexpensive -- the ground is scraped and leveled, forms are built and then concrete is poured into the forms, smoothed, and allowed to cure, at which time walls and other surfaces can begin to be constructed. This method can lead to some water coming up through the floor if the ground water level is too high, and this method can also be problematic, limiting the types of flooring that can be used inside.

- **Pre-Cast Concrete Slab**
  A second method of ground floor construction involves pre cast concrete slabs that are brought in already cast and cured and that are set into place over scraped and leveled ground and then either sealed between each slab or filled with concrete in the joints to make one single concrete floor. This method is easier than conventional concrete slab construction and it is cheaper in some cases. In addition, since the slabs are pre cast, they are already cured, and it is a time savings over conventional concrete slab ground floor construction methods.

- **Dowelled Joint Concrete Floor**
  For larger projects, reinforced or dowel jointed concrete construction is used. This uses pre-cast slabs with metal rebar dowels that protrude and that fit into holes in other slabs, leading to a support method that can help join the two slabs together without cracking and that can be filled with elastomeric sealant in between to prevent water and vapor intrusion into the finished space.

- **Synthetic Wood**
  Other methods of ground floor construction include synthetic wood, made from plastic and other composite materials that are resistant to insects and water infiltration and will last longer than wood floors.

Fill the slab area with a suitable material to finished grade.

Capillary fill is used where moisture may create a problem.
Crushed limestone or other aggregate base materials can be used for slabs with heavy loads like warehouse floors and aircraft hangars.
Cohesive materials like clay are sometimes used where the subgrade cannot be sufficiently stabilized using conventional methods.

Photo 3.23 Cohessive soil were brought by bulldozer which be poured into floor slab

Photo 3.24 A lot of workers were smooth the soil with smoothly.

Hardcore

The purpose of hardcore is to fill in any small pockets that have form during over site excavation, to provide are firm base on which to place a concrete bad and to help spread any point loads over the greater area. It also acts against capillary action of moisture within the soil. Hardcore is usually laid in 100-150 mm layers to the required depth, and its is important that each layer is well compacted, using a roller if necessary, to prevent any unacceptable settlement beneath the solid floor. After soil had completely full filled the space, then, hardcore will fill in about 1m on soil. Then, the hardcore will be compact with hardly by a compact machine

Photo 3.25 full fill the hardcore in floor slab

Photo 3.26 The hardcore will be compact with hardly by a compact machine

Binding

This is used to even off the surface of hardcore if a damp-proof membrane is to be place under the concrete bed or if a reinforced concrete bed is specified. First, it will prevent the damp-proof membrane from being punctured by the hardcore and, second, it will provide a true surface from which the reinforcement can be positioned. Blinding generally consists of a layer of sand 25-50 mm thick or a 50-75 mm layer of week concrete (1:12 mix usually suitable) if a true surface of a reinforced concrete is required.

Photo 3.28 The rebars will be positioned with carefully

Concrete Work

I. **First, calculate the quantity of concrete that need to complete the slab**
Measuring the length times the width, then multiplying it by the depth, in feet or a decimal fraction thereof will give you the total cubic feet of material required. To convert this number to cubic yards, divide it by 27. Allow enough extra concrete to fill any monolithic footings, depressed slabs, and low areas in the fill material.

II. **Order the concrete from a ready mix concrete supplier, and schedule the delivery to coincide with the concrete placement schedule**
This means both the date and time of the pour, and the interval of delivery for multiple trucks to arrive on the job site so the concrete crew has time to discharge and tend to each truckload, while not having to wait for the next truck to arrive.

III. **Coordinate concrete testing with a qualified testing laboratory if the construction contract requires it**

- Slump. This test determines the plasticity of the concrete material. A vertical cone shaped mold is filled with concrete and the amount the concrete slumps is measured, to make sure it is not too wet to meet specification for the job.
- Temperature. Concrete suffers detrimental effects when it becomes too hot, so the temperature of the product is monitored during placement.
- Air entrainment. Chemicals are added to the concrete to ensure air is entrained in the mixture. These tiny voids will allow the concrete to expand and contract more before cracking when concrete is expected to be subjected to large temperature variations over time. A typical air entrainment requirement is 3-5%.
- Compressive strength. Concrete strength is measured in PSI (pounds per square inch), and special plastic molds are used to collect samples of the material which are later used in the testing lab's laboratory to determine the concrete's strength.

IV. Plan on beginning large slab placements as early as possible to allow time to complete the project successfully

V. Set up all equipment used in the concrete placement on the day of the pou

- If a concrete pump truck is to be used, have it arrive an hour or so early to allow it to be set up and in position, and to let the pump operator get an idea of the placement plan
- Service troweling machines, including checking the controls, the blades, and making sure they are full of engine oil and gasoline.
- Check straight edges, screed boards, power screeds, and bull floats to make sure they are in good condition.
- Make sure concrete vibrators are in good condition if the slab requires their use.
- Check personal safety equipment, such as gloves, rubber boots, and eye protection.
- Clean and check all hand tools so they are in good working condition.

VI. Begin the concrete placement at a corner and continuing placing the concrete along the grade or screed lines as you have established.

Concrete can be placed in parallel sections as long as each subsequent section is placed before the prior section has begun to set up, or there will be cold joints between the two.

VII. Trowel the concrete with the blades at their flattest setting

This gives them more surface area, so they will not tend to sink in as they spin across the surface. Using a combination type blade, rather than a finishing blade is better for this step.

Photo 3.29 Concrete will be poured and then will be compacted

Photo 3.30 The concrete will be poured on the hardcore

3.3.13 Step 13 : Substructure of building fully done

Substructure means thst building elments which only include the foundation, ground bean, stump and ground floor slab. Now, substructure of bungalow that the writer investigate and observe were fully done. As the observation , the writer can conclude that the substructure work of a bungalow or house need to fully constructed about 2 or 3 month. The labour worker that need in this construction not too many.

Photo 3.31 The substructure of bungalow were completely constructed.

Photo 3.32 Then, the colum will install after the substructure work done.

CHAPTER 4

CONCLUSION AND RECOMMENDATION

To learn how construction substructure sequentially properly in actual construction. Proper planning is important in construction because it closely linked to the overall construction progress. Although good planning is made, it depends on the person responsible for according to plan. Not all parties able to according to plan that has been plan, there by their own free willingness and on the basis of which blocks out some not on schedule or planning.

In addition, the construction also shows the number of employees and also the use of the machine during construction safety pit. The effect of two of this matter can play a big role to smooth the construction progress. From the number of employees are able to speed up the construction and the use of urbane machine also assists a construction.

There a few problems that writer focus on for this construction, there are the weather condition at Chendering. Secondly is the worker attitudes that do not concern about their work that cause mistake of their job. The problem that exists make the construction slow down and do not follow the schedule as usually.

Problem that exists had been settling by variety of way and for me, they do not take long time to think about it. It just make a simple discussion with the involve parties and they get the ways how to settle the problem. But for the writter, it not good situations if the other parties that also have responsibility to this project do not know the problem.

The construction is to build substrucutre and the position of the substructure is below the ground level. So the types that concrete used is suitable for substructure work. They used concrete grade 25 water proofing. Water proofing is an admixture for the concrete because to make concrete below the ground level.

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