UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITY TECHNOLOGY MARA

(PERAK)

OCTOBER 2013

It is recommended that this practical training report prepared

By

Nur Suziana Bt Mohamad

2011661142

STRUCTURAL WORKS

Accepted in partial fulfillment of the requirements for obtaining a Diploma in Building

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STUDENT DECLARATION

It is with this, the work of writing this Practical Training Report was produced entirely by me except as expressed through practical training that I went through a period of 5 months started from 13th May 2013 to 28th September 2013 at Senandung Bakti (M) Sdn. Bhd. It is also as one of the requirements to pass the course DBN307 and received in partial fulfillment of the requirements for obtaining a Diploma in Building.

Name : Nur Suziana Bt Mohamad

UiTM Student No : 2011661142

Date : 28 September 2013

ACKNOWLEDGEMENT

Alhamdulillah grateful to Allah S.W.T because with bless I manage to completing my practical training from 13 May 2013 until 28 September 2013. This report is to fulfill the condition of diploma in Building. Thank you Allah for good health during several month so that I can complete the task that have been given to me.

First and foremost, thanks to the contractor of this project Encik Ahmad Nidzam bin Ibrahim from Senandung Bakti (M) Sdn. Bhd. company because give me an opportunity to do practical training with his company and I can fulfill the condition in my course in hope that I will get Diploma in Building at UiTM which will help me in the future. He give many knowledge to me about building construction and take care of my welfare as a practical student during my practical training.

Besides that, I would like to thank to all of lecturer at UiTM especially Puan Noor Sahidah bt Samsudin because helping me in finishing the practical report by giving valuable guidance and advice. Their willingness to motivate me contributed tremendously to my practical training. I also would like to thanks them for showing me some example and some knowledge that related to the topic of my practical.

The special thanks to my parents for giving me support and motivation while completing this task. All the expenses they give to me to complete this practical deeply appreciated.

ABSTRACT

This report divided by four chapters which is introduction, company background, case study and conclusion and recommendation. This report is discussed about structural works for semi D house. This house will build for FELDA's staff. Structure includes foundation, ground beam, column and roof beam. The size of installation for reinforcement bar is different for every structure except for ground beam and roof beam because both of the structures have an exactly size. My practical reports are focused on structural works such as reinforcement bar works, formwork and concreting works. Reinforcement bar works is a common steel bar that is commonly used as a tension device in reinforced concrete and reinforced masonry structures, to strengthen and hold the concrete in compression. It was the hard process when bending the reinforcement bar which is this site using manual method by used workers because this is only the small project. Besides, there are many types and sizes of the reinforcement bar that could explain in the next chapter. Formwork is a die or a mould including all supporting structures, used to shape and support the concrete until it attains sufficient strength to carry its own weight. It should be capable of carrying all imposed dead and live loads apart from its own weight. Formwork has been in use since the beginning of concrete construction. There are the example of material used for formwork, plastics, timber, fiberglass and steel. Concreting in placing is to deposit the concrete as close as possible to its final position as quickly and efficiently as you can, so that segregation is avoided and it can be fully compacted. There are two type of concrete test, commonly used in construction which is slump test and cube test. During the structural works, many problems that can identify and I have a share recommendation and conclusion at the end of the report. Lastly, this report explain about the reinforcement bar works, formwork and concreting works in detail and more general in practical.

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ABBREVIATIONS

EOT	Extension of Time

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Building needs structure to stands and to be strength. Every part of a building is subject to the effects of outside forces such as gravity, wind, earthquakes, and temperature changes. Thought history, people have constructed buildings that have withstood these forces over a long period of time. Hence, buildings also have a structure to transfer the load from the roof until the foundation than transfer load to soil. Besides, the design of building will be giving an effect to the building structure for example the type and size of structure. The material used for the structure for each building are shows the ability and the strength of building. The topic that I had chosen is structural works which is focused on formwork, concreting and reinforcement for column, beam and foundation. There are the timber formwork used to build the structure and they are use in-situ method for this project construction. This project needs skilled worker to construct the semi D house to make sure the structure have a high quality and the project works smoothly without any problem.

1.2 OBJECTIVES OF THE REPORT

1. To study the structural works for semi D house construction.

2. To identifying the method of structural construction for semi D house.

1.3 SCOPE OF STUDY

The studies are conducted at Keratong 5 which is built the FELDA's staff with the semi D house. These projects are cooperating with FELDA Engineering Services. There are 15 units of the house with the 12 units of semi D house and three units of bungalow. During my practical training I would like to prepare the report with the topic structural works.

The structural works are not easy like we thought because it was much method that can be used and project manager will be decided what the best method that used at the project. The reports for case studies are focused on rebar works, formwork and concreting works.

Besides that, this report are helping me and another students in department in building for the future when started working. This report can being as notes and reference when students facing on the real employment.

1.4 METHOD OF STUDY

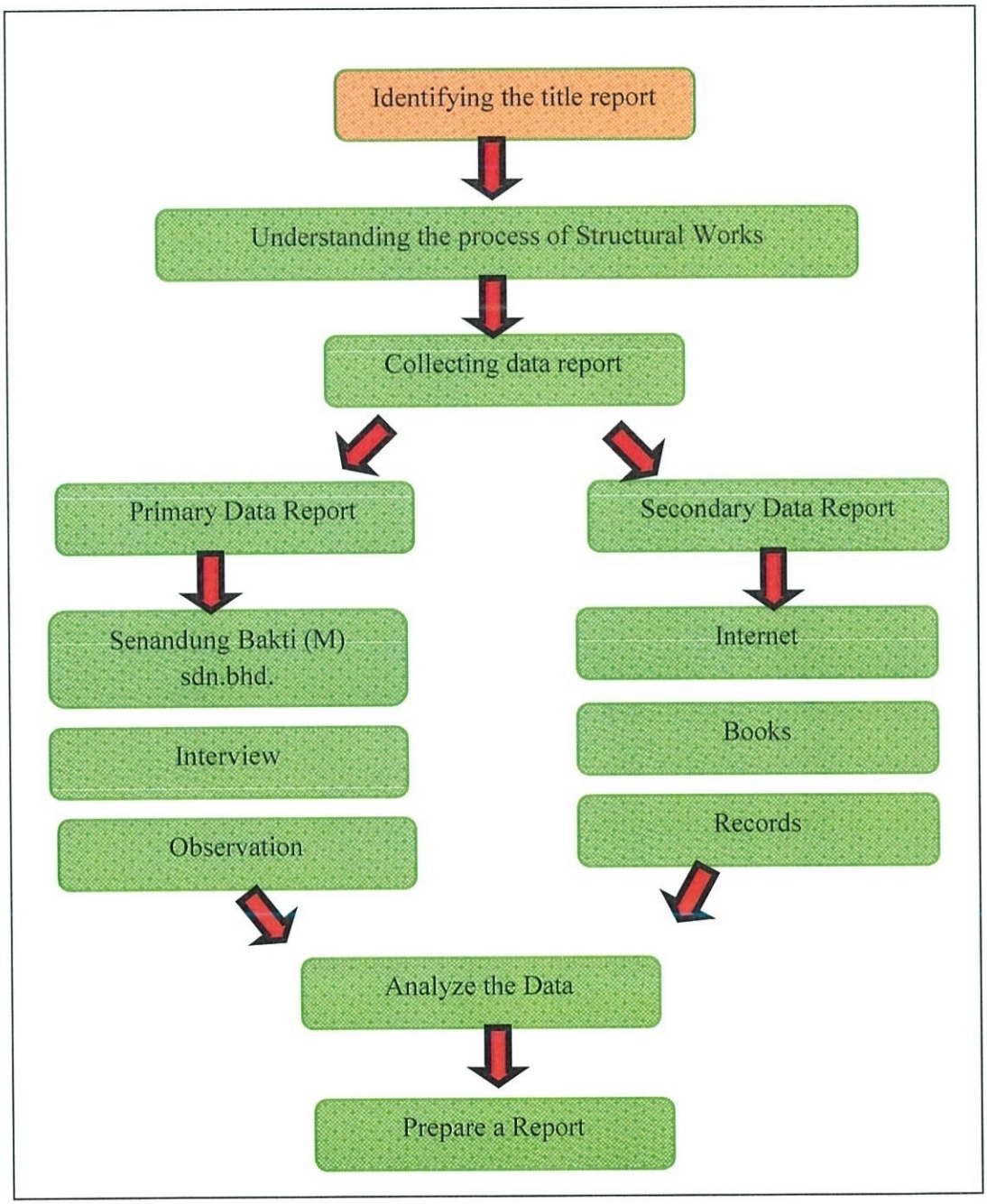

Figure 1: Method of Study

PRIMARY DATA REPORT

SENANDUNG BAKTI (M) Sdn. Bhd.

Senandung Bakti is a company of my practical training. I choose this company because the company doing the electrical and construction works and have much experience in this scope. I used the company profile to get information about this project, current project and previous project from the employer. This company normally focused on electrical works and it's new for this company for doing construction works and this is first time to cooperate with FELDA Engineering Services.

INTERVIEW

Based on workers, I get the information of project which is skilled worker and unskilled worker. Workers give a good cooperation and they answer all my question and I satisfied with their answer. The information that workers give are useful and make me finished to complete this practical report.

OBSERVATION

I get information from the observation at surroundings of the project site for example from what workers do. After me doing observation, I can find that solution and I analysis the data by myself and do some research to make sure the truth of the data from an observation.

SECONDARY DATA REPORT

INTERNET

The method of study that I can do research is from internet. From this media I can get a lot of data about structural works that I study. The information is about method and process of structural works. I can get the information that I focused for example rebar works, formwork and concreting works. Besides, I can get the company profile from this media.

BOOK

Books are the one of the secondary data that I can find to complete this report. There are many data from book that I read and analysis then I make summary to make sure it is easy to read and understand. Besides that, books is the one of resources that we can believe and proven the truth.

RECORDS

During my practical training, I have records a few video to make me more understand and remember the method of something or any work of workers doing such as concreting works.

CHAPTER 2

COMPANY BACKGROUND

2.1 INTRODUCTION

The project is started on November 2012 by built up a semi-D house of Felda staff at Felda Keratong 5. This project own by FELDA Engineering Sdn. Bhd. These projects cooperate with MFJ Berkat Enterprise as a main contractor. Senandung Bakti (M) Sdn. Bhd as a sub contractor. This project takes time almost one month for demolition process. The period of project is started from 26th November 2012 and end on 28th July 2013. Netherless, this project delay for two month and finished on end of November 2013.

This construction project started on December because of problem due to demolisition work. Then, the project delayed again because due to poor weather condition on December. All of an excavation work cannot be proceed and need to stop until weather back to a good condition. The setting out of land started on January 2013.

The contractors will do the work with the following specification and standards set by the FELDA Engineeering Services Sdn. Bhd. Other than that, the parties involved are committed with the works including workers to ensure the completetion of the works.

2.2 COMPANY PARTICULAR

NAMEOF COMPANY	: SENANDUNG BAKTI (M) SDN.BHD
ADDRESS	: NO. 15, JALAN MELOR 8E, DESA MELOR, 48200 SERENDAH, SELANGOR.
MANAGER	: ENCIK AHMAD NIDZAM BIN IBRAHIM
NO. TEL	:
NO. FAX	: 03 – 92351044
EMAIL	: senandungbakti@yahoo.com

2.3 ORGANIZATION CHART

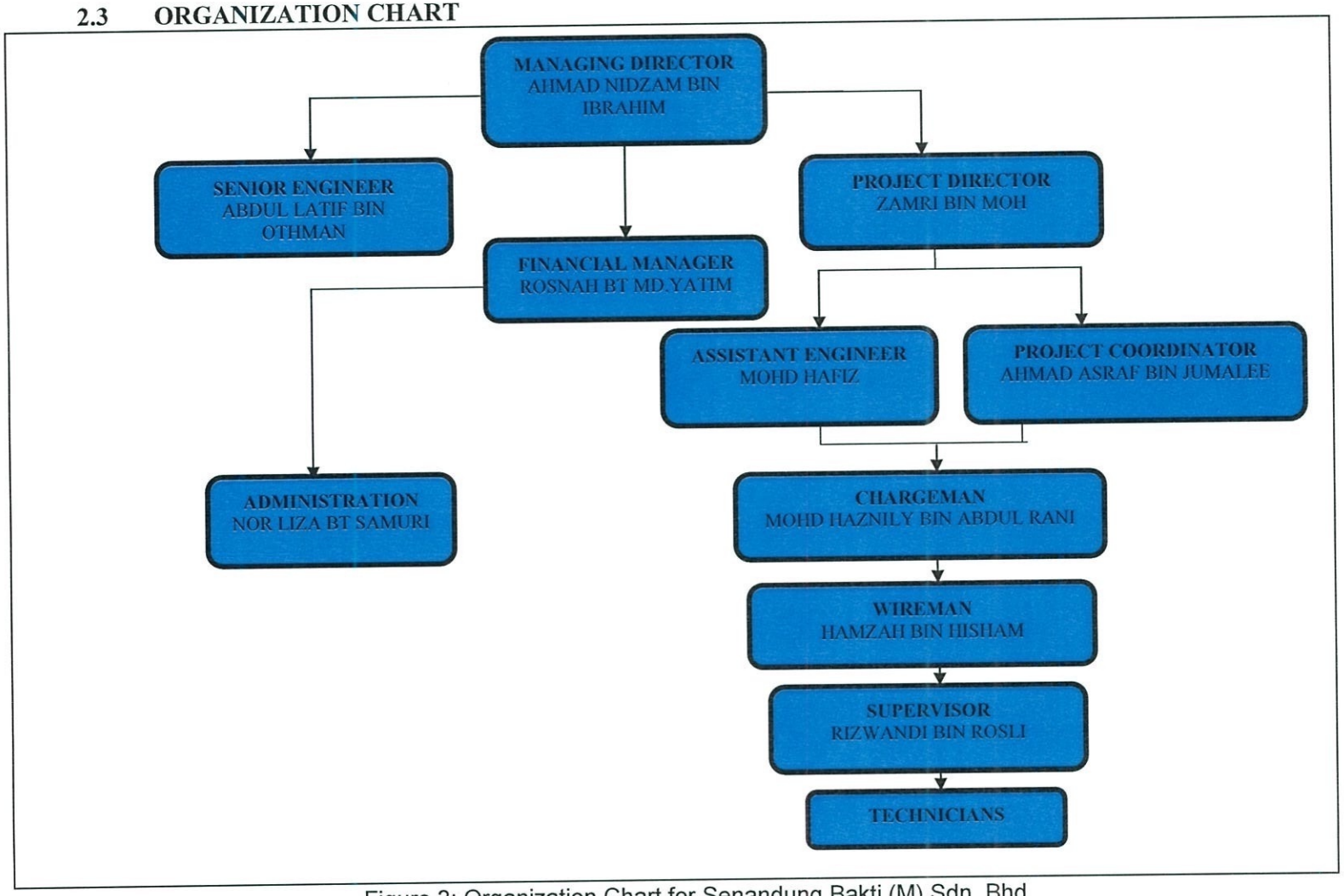

Figure 2: Organization Chart for Senandung Bakti (M) Sdn. Bhd.

2.4 LIST OF PROJECT

PREVIOUS PROJECTS

Table 1: Previous Projects

NO	TITLE	CONTRACT SUM	START	FINISH
1	Bangunan Pencawang TNB Tanjung Malim	RM 450,000.00	8/4/2004	24/12/2004
2	Upgrading Work at Stadium Putra	RM 150,000.00	18/8/2005	26/03/2005
3	Petronas Oil Gas Terminal, Kertih	RM 2,500,000.00	17/7/2005	15/2/2007
4	Upgrading Electrical System PDRM, Jalan Semarak	RM 700,000.00	21/5/2007	1/9/2007
5	Stainless Steel Works at Rapid KL Station	RM 200,000.00	3/6/2009	29/1/2010
6	Electrical Works at KTMB Station OKU Lift	RM 95,000.00	18/4/2010	28/8/2010
7	Bangunan Pusat Islam UiTM, Pulau Pinang	RM 550,000.00	25/6/2011	16/4/2011
8	Bangunan Utama UiTM, Pulau Pinang	1,000,000.00	25/6/2011	16/4/2011

CURRENT PROJECTS

Table 2: Current Projects

NO	TITLE	CONTRACT SUM	START	FINISH
1	Electrical Works at KTMB Station, Bahau	RM 1,450,000.00	8/9/2012	25/6/2013
2	Semi D House, Keratong 5	RM 1,743,550.00	26/11/2012	28/12/2013

2.5 INFORMATION OF PROJECT

Title of project is purpose to build a staff's house type C1, D1, D2 and twin house E1 until E6 and another work involved at FELDA Keratong 5, Bandar Tun Razak, Pahang. The client is FELDA Engineering Services Sdn. Bhd. The main contractor is MFJ Berkat Enterprise and the sub contractor is Senandung Bakti (M) Sdn. Bhd. The main office of Senandung Bakti is at Serendah, Selangor.

The amount of contract awarded to sub contractor about RM 1,743,550.00. This project started on 26 November 2012 and finish on 28 July 2013. This project delay about two months because of poor a weather condition and due to cost. This site of project stated given to the project manager on 26 November 2012. This company does Extension of Time (EOT) for the first time because this project delayed for two months.

These projects have eight general workers which are from Bangladesh but at the same time they are a little from Myanmar and Indian nationality. Besides that, project has one site supervisor. Every month the company will do a meeting with the FELDA Engineering's staff from Kuantan and Kuala Lumpur. These meetings to present about the progress work that having done during the construction.

CHAPTER 3

CASE STUDY

3.1 INTRODUCTION

Every building has two type of wall which is load bearing wall and non load bearing wall. Load bearing wall is a small structure with a minimum high of building and no need a structure. The building only depends on the thick wall to carry out load from roof.

Meanwhile, non load bearing wall is a wall which is need a many structure to carry load from roof for example beam and column then the load will transfer to footing.

Besides that, every high rise building need a non load bearing wall for their construction to make the building more economic and stronger.

The main things in building construction is structure because when a building have a weak structure, a building will have many defect and maybe can cause the building collapse easily. Additional to that, structure must use good method and material to built a building and material used is harder and can used in long period. In construction, a structure there is three things that must be considered which is reinforcement bar work, formwork and concreting. All of them are connected each other to produce a good quality of building's structure.

3.2 PROJECT BACKGROUND

The project background is basically cooperation between FELDA Engineering Services and MFJ Berkat Enterprise as a main contractor. The owner of this project is FELDA Engineering Services which is this project will organize by manager at Keratong 5, Encik Tamrin bin Zakaria. The sub contractor of this project is Senandung Bakti (M) Sdn. Bhd. This project built for FELDA's staff at FELDA Keratong 5 and the house built about 15 units of house which is a bungalow and semi D house. The amount of contract is RM 1,743,550.00 and contractor need to pay RM 87,178.00 as a deposit to FELDA Engineering Service. These projects have about 20 workers from the Bangladesh. At the early of project, project manager used Indonesia's workers.

3.3 CASE STUDY

3.3.1 REINFORCEMENT BAR WORKS

i) SIZE OF STEEL BAR

Mostly, structure needs a steel bar to make structure more strength and harder for example footing, column and beam. The bar usually used in construction is fully metal and did not have any mixture with another material for example copper. There are many sizes of bar are used in construction such as mild steel round bar, high-yield round bars, high-yield square twisted bars, stainless steel and wire reinforcement.

Reinforcement bar works is a common steel bar that is commonly used as a tension device in reinforced concrete and reinforced masonry structures, to strengthen and hold the concrete in compression. It is usually in the form of carbon steel bars or wires, and the surfaces may be deformed for a better bond with the concrete. It is also known as reinforcement steel. Reinforcement bar have been used in construction since at least the 18th Century for example, debars were used to form the carcass of the Leaning Tower of Nevyansk in Russia. The cast iron used for the rebar was of high quality, and there is no corrosion on them to this day. More recently these techniques have been successively refined by embedding the steel bars in the concrete, and by the introduction of deformed bars to improve bonding, thus producing modern reinforced concrete.

Rebar is cast into it to carry the tensile loads. For this purpose, the steel reinforcement of a concrete structure is conceptually, divided in two main types of reinforcement, primary reinforcement and secondary reinforcement.

Primary reinforcement refers to the steel which is employed specifically to guarantee the necessary resistance needed by the structure to support the design loads.

Secondary reinforcement, also known as distribution or thermal reinforcement is employed for durability and aesthetic reasons, by providing enough localized resistance to limit cracking and resist stresses caused by effects such as temperature changes and shrinkage. Rebar may also be used to hold other steel bars in the correct position to accommodate their loads.

Normally, construction will used mild steel round bar which is a very thick and harder than others. Besides that, wire reinforcement used as a bounding of the bars. There are the sizes of reinforcement column for stump to ground floor bars in table 3.

Table 3: Reinforcement Column for Stump to Ground Floor

TYPE	SIZE	HEIGHT		TYPE OF STEEL
		COLUMN	L	
C1	225 225	2015	230	4T 16, R6 – 175 C/C
C2	225 225	2115	350	4T 16, R6 – 175 C/C
C3	150 225	1855	230	4T 12, R6 – 125 C/C
C4	275 275	1855	100	8T 12, R6 – 175 C/C
C5	225 225	2015	100	4T 16, R6 – 175 C/C

The table below shows the reinforcement for footing that is foundation is a one of structural works.

Table 4: Reinforcement for Footing

TYPE	SIZE	DEPTH		TYPE OF REINFORCEMENT	NO OF FOOTING	NO OF REINFORCEMENT
		D	D1			
F1	600 × 600	250	325	T12 – 150 C/C	8	8
F2	800 × 800	250	325	T12 – 150 C/C	6	10
F3	1000 × 1000	250	325	T12 – 150 C/C	10	7
F4	1200 × 1200	250	325	T12 – 150 C/C	5	8
F5	1400 × 1400	250	325	T12 – 150 C/C	3	9
F6	2100 × 2100	350	425	T12 – 100 C/C	1	21

The laps in reinforcements are used in this project:

42 Dia. Mild Steel bars in tension

50 Dia. High Steel bars in tension

40 Dia. Mild Steel bars in compression

Where there is more than one layer of reinforcement bars in beams 25 mm dia. Spacers must be provided at 1.5 m c/c

High Tensile bars is denoted by "Y" or "H.T.S" having Characteristic Strength ($460\ N/mm^2$)

Mild Steel bars is denoted by "R" or "M.S" having Characteristic Strength ($250\ N/mm^2$)

Reinforced bars are a type of steel rod that is inserted into concrete to create reinforced concrete. Rebar is very important in buildings made of concrete, or buildings that have a substantial amount of it. Rebar not only adds strength to normal concrete, it gives concrete flexibility.

Every structure has the function for reinforcement bar. The picture below showed the example of reinforcement for ground beam and roof beam. There have the size of bar and the links.

GROUND BEAM

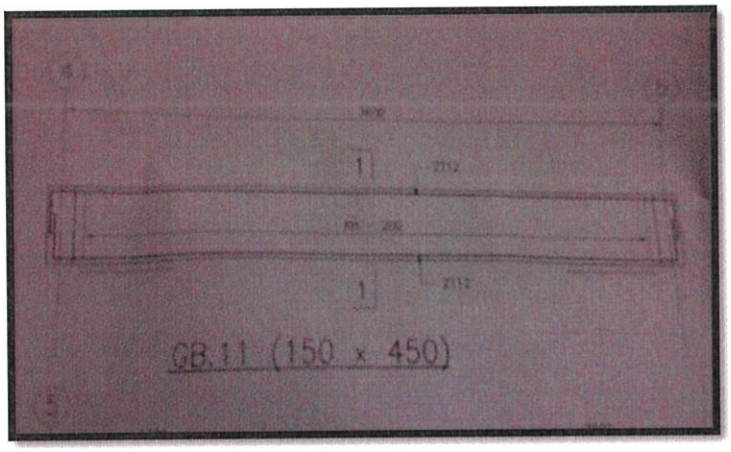

Figure 3: Drawing of Rebar for Ground Beam

ROOF BEAM

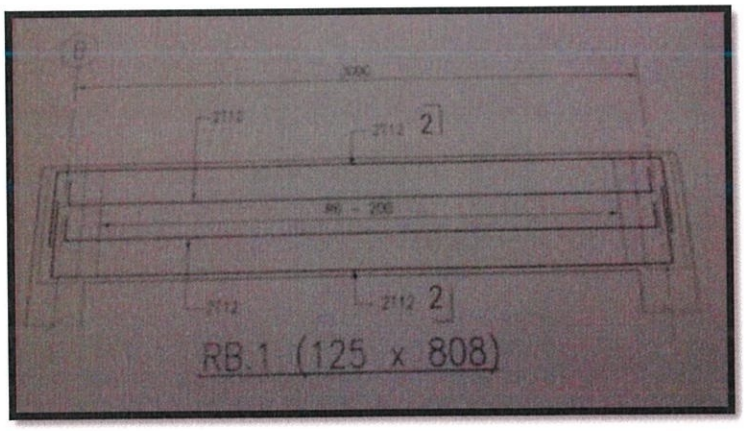

Figure 4: Drawing of Rebar for Roof Beam

The pictures below are about the installation of footing, ground beam, floor slab, column and roof beam for reinforcement bar which is has different size.

Figure 5: Reinforcement Bar at Footing

Figure 6: Reinforcement Bar at Ground Beam

Figure 7: Reinforcement Bar at Floor Slab

Figure 8: Reinforcement Bar at Column

Figure 9: Reinforcement Bar at Roof Beam

3.3.2 FORMWORK

Formwork is a die or a mould including all supporting structures, used to shape and support the concrete until it attains sufficient strength to carry its own weight. It should be capable of carrying all imposed dead and live loads apart from its own weight. Formwork has a many type such as steel, plastics, aluminium and timber. The material most commonly being used to date is timber. However, due to the depleting forest reserves and increasing cost of timber the use of alternate materials such as plywood and steel has become prominent. More recently, materials such as plastics and fiberglass are also being used for pre-fabricating formwork.

The types of material to be used depend on the nature of construction as well as availability and cost of material. The constraints on the project such as overall cost, time of completion also play a major role in the use of a particular material for formwork. Normally, every building construction using a timber formwork and it was same at my practical site. This is because using timber is easy and low cost then it can use many time. Formwork used to cover the concrete until the concrete dry and we can open it and it takes about three days until seven days to make sure the concrete harder. To make the concrete more strength, it will take seven days.

There are many advantages by using timber formwork which is It is economical for small construction jobs, It is design flexible and easy to erect, It has good thermal insulation which makes it useful to be used in colder Regions and It can easily be made into any shape or size. It can use for the long period. There are different types of formwork available for different purposes. Generally, the formworks for vertical concreting are called wall forms and those for horizontal concreting are called slab or floor forms. The various types of formwork available today in the market are discussed in detail. The disadvantage by using timber formwork needs a skilled worker, high cost, and the installations are difficult.

The figure below will show the example of formwork that used on site by structure which is footing, ground beam, column and roof beam.

Figure 10: Formwork of Footing

Figure 11: Formwork of Ground Beam

Figure 12: Formwork of column

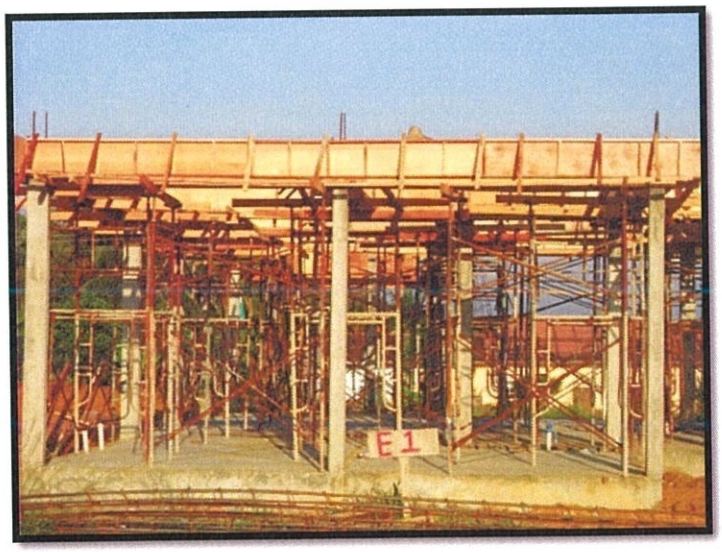

Figure 13: Formwork of Roof Beam

i) DURATION TAKEN FOR REMOVAL OF FORMWORK

Table 5: Duration for Removal of Formwork

NO	ELEMENT	DURATION
1	Walls Columns and Vertical Sides of Beams	1-2 DAYS
2	Slab	3 DAYS
3	Beam Soffit	7 DAYS
4	Removal of Props to Slabs	
	1) Slab Spanning Up to 4.5m	7 DAYS
	2) Slab Spanning Over 4.5m	14 DAYS
5	Removal of Props to Beams and Arches	
	1)Spanning Up to 6 Mts	14 DAYS
	2)Spanning Over 6 Mts	21 DAYS

ii) MATERIALS FOR FORMWORK

Formwork can be made out of a large variety of materials. The material most commonly being used to date is timber. However, due to the depleting forest reserves and increasing cost of timber the use of alternate materials such as plywood and steel has become prominent. More recently, materials such as plastics and fiberglass are also being used for pre-fabricating formwork. The type of material to be used depends on the nature of construction as well as availability and cost of material. The constraints on the project such as overall cost, time of completion also play a major role in the use of a particular material for formwork. At my practical site are used timber formworks because they are many advantages by using this material.

iii) ADVANTAGES OF USING TIMBER FORMWORKS

1) It should be durable and treatable
2) It should have sufficient strength characteristics
3) It should be light weight and well seasoned without warping
4) It should hold nails well

iv) COLUMN FORMWORK SYSTEM

In the Column formwork system the H-Beams along with steel walers and accessories makeup the assembly. The Column formwork facilitates fixing of working platforms for access, checking of reinforcement and concreting. The formwork panel along with the working platform and alignment systems can be lifted as a single unit using a crane thus the labour involved in each operation of erection and deshuttering is reduced to a minimum. The panels are formed in the carpentry workshop at site and the number of operations/assembly of components at each location is minimal and hence accuracy is maintained. Since large panels are handled as a single unit, the damage/loss of small components is eliminated contributing to very high material productivity. In the absence of a crane the panels can be dismantled and handled separately. The column formwork system can handle very large pressures generated due to pumping of concrete.

3.3.3 CONCRETING

At this site used vibration as a concrete test because it was easy, faster and low cost and it's shown on figure 14. Usually, concrete used for structure and it's have a good strength and harder. Concrete is a mixture of sand, cement and aggregate. This project used 1:3:6 as a concrete mixture. There are the examples of concrete in figure 15.

Figure 14: Vibrator Machine

Figure 15: Concrete on the Floor Slab

There are two types of concrete test involved in this project is slump test and cube test. Normally for slump test are the workers will be doing the testing on site. Then, for the cube test normally will be testing at laboratory with the machine. For the slump test only doing there and did not have a duration to wait until the concrete are dry. For the cube test, workers do six samples to testing the concrete. The first cube test with the three samples by 7 days and the second test with the three samples are 28 days.

Before started the concreting works, the surface of timber formwork must sweep with the oil to make sure the concrete did not have any detects and the timber are can use for the long period for the next project. Next, remove all the dirty and ash from the formwork surface.

i) DETERIORATION OF CONCRETE

Generally, the combination of water and favorable temperatures increases the strength of concrete throughout its life cycle. However, water also can act as the transport system for nearly all mechanisms aggressive to concrete for example:

1) Porous, water-saturated concrete that does not have adequate strength and entrained air is prone to scaling, which a deterioration mechanism is caused by freezing of water in concrete.

2) Water can carry aggressive chemicals into the concrete surface such as acids, sulfates, or chlorides.

3) Concrete that contains alkali-reactive aggregates is subject to deleterious expansion from water.

4) Water that passes over the surface of concrete with a high velocity can erode the surface over time.

ii) PLANT, MACHINERY AND EQUIPMENT THAT USED IN CONCRETING WORKS

1) Tower Crane / Mobile Crane
2) Concrete Pumps
3) Concreting Buckets
4) Vibrators
5) Wheelbarrows

iii) METHOD OF CONCRETE REPAIR

Concrete slabs and foundations typically become damaged due to a poorly prepared undersurface and water penetration. If the soil or subsurface of the concrete slab is not properly compacted, the soil can move and cause cracks or breaks in the surface. Water penetrating under the concrete can also cause the slab or foundation to move. Repairs to some concrete faults can be accomplished by the homeowner. Larger problems may entail the services of a contractor with specialized equipment.

iv) SMALL CRACK IN SLAB

Cracks that do not cause the surface of the slab to move appreciably can be repaired by the homeowner. The crack is chiseled out wider at the bottom of the crack than at the top. The crack is kept wet for a 24-hour period. Slurry of concrete mix is wiped on the walls of the crack and a heavier paste-like mix is poured into the cavity. The repair is kept moist and covered with plastic for a five to seven day period. This allows the repair.

v) COMPACTING CONCRETE

After concrete has been mixed, transported and placed, it contains entrapped air in the form or voids. The object of compaction is to get rid of as much as possible for this unwanted entrapped air down to less than 1% is usually the aim.

The amount of entrapped air is related to the workability concrete with a 75 mm slump contains about 5 % air, while concrete of 25 mm slump contains about 20 %. This is why a low-slump concrete requires more compactive effort-either a longer time or more vibrators compared with a concrete with a higher slump.

vi) VIBRATORS

These are mobile items of mechanical plant used to vibrate (shake) air out of fresh concrete.

There are 2 major types of vibrators:

1) External vibrators (Form vibrators)
2) Internal vibrators (Poker/Immersion vibrators)

All types of vibrators have motors, which can be driven by:

1) Compressed air
2) Main supply electricity (230 or 400V & 50Hz) motors
3) High frequency electricity motors
4) Petrol or diesel (liquid fuel)

vii) COMMON TEST FOR FRESH CONCRETE

Slump, air content, unit weight and compressive strength tests are the most common tests. Slump is a measure of consistency, or relative ability of the concrete to flow. If the concrete can't flow because the consistency or slump is too low, there are potential problems with proper consolidation. If the concrete won't stop flowing because the slump is too high, there are potential problems with mortar loss through the formwork, excessive formwork pressures, finishing delays and segregation.

Air content measures the total air content in a sample of fresh concrete, but does not indicate what the final in-place air content will be, because a certain amount of air is lost in transportation, consolidating, placement and finishing. Unit weight measures the weight of a known volume of fresh concrete.

viii) REASON TEST CONCRETE MUST DOING AT SITE

Concrete is tested to ensure that the material that was specified and bought is the same material delivered to the job site. There are a dozen different test methods for freshly mixed concrete and at least another dozen tests for hardened concrete, not including test methods unique to organizations like the Army Corps of Engineers, the Federal Highway Administration, and state departments of transportation.

Table 6: Table of Concrete for Footing

TYPE OF FOOTING	NUMBER OF FOOTING	SIZE (m^3)			VOLUME OF CONCRETE (m^3)	VOLUME OF CONCRETE (m^3)
		L	B	DEPTH	1 FOOTING	1 UNIT HOUSE
F1	8	0.60	0.60	0.325	0.117	0.936
F2	6	0.80	0.80	0.325	0.208	1.248
F3	10	1.00	1.00	0.325	0.325	3.25
F4	5	1.20	1.20	0.325	0.468	2.34
F5	3	1.40	1.40	0.325	0.637	1.911
F6	1	2.10	2.10	0.425	1.87425	1.87425

CHAPTER 4

CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

In conclusion, during practical training in five months in building construction at FELDA Keratong 5, many input have learned based on structural works for this report. Here, a lot of new experience and also can feel the natural setting of employment. At the same time, a lot of knowledge in structure works for maintenance, installation, and also a material used.

That theory and practical have many differences. During my period of training in the industry, a lot of good impact to me in time management, interaction between student and workers and also other industrial training. Then, I was also given the opportunity to do work in every visit that had the opportunity to go and do the work.

I can conclude that based on the case study to make a detail study of a building construction, this work giving me a lot of knowledge how to install the building in structural works and monitor workers in a different nationalism. As a student of industrial training for five months, I believed and make some research which is theory and practical are not much different in structural works. This topic really can help when in my future in this province.

4.2 PROBLEM AND SOLUTION

The problem of the contractors doing work in demolishing the house of FELDA's staff because all of the material from the old house is not pick up quickly. The problem faced by workers is difficulty in doing demolisation because the site did not do fully clearance.

The next problem is difficulty in obtaining raw materials obtained difficult during the monsoon season recently that found that has caused the sand to do the cementing process is very difficult. The main problem during period of construction here is the contractor did not get claim before started the project and need to use their own capital to buy another material which is involved in early construction. Moreover, contractors need to pay a rent of machineries such as concrete mixer and excavator.

Next, the problem about the structure is weather because when pouring the concrete the rain down. Hence, it makes the concrete hard to dry and have a long time to dry. Other than that, the others initiatives is using vibrator to less the concrete bleeding. Besides, the structures which is column and beam have a cracking because the failure of concrete.

4.3 RECOMMENDATION

The recommendation of these projects is workers did not take good a care of their safety and health. Mostly, workers at here did not wear the safety boots and all of them only wear slipper then did not wear safety helmets.

Furthermore, this situation can cause danger to workers and the risk of accident increase. Contractors should be given a description of the scope of construction and what to do in such work. Contractors also need to know the way in which method should be used in the construction work. As an employee, they must have the skills on doing their job in building construction. Contractors must provide employees briefing or training in advance or provide information prior to start and carried out the construction work before any work is to be carried out.

Next, contractors and all of parties involved in this work should be doing monitoring and checking in all the work done by unskilled workers in place to ensure that the work done is up to the standard specification based on work and as in drawing specification. At the same time, the parties involved must often make inspection on materials and methods used are correct and do not cheat in construction work. Each employee will be test in strength and skill level in doing construction work and employees will also be tested in terms of the quality of their work and their discipline in doing the work.

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