



DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

STRUCTURE CONSTRUCTION

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UNIVERSITI TEKNOLOGI MARA
(PERAK)

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By

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STRUCTURE CONSTRUCTION

(SUPERSTRUCTURE)

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(PERAK)

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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 MRM GROUP OF COMPANIES for duration 19 weeks and 4days starting from 23 AUGUST 2021 and ended on 7 JANUARY 20222. It is submitted as one of the prerequisite requirements of BGN 310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

.....

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Alhamdulillah, praise to Allah SWT, the Most Merciful, the Most Graceful.

I would like to extend my gratitude for the guidance, advice and help throughout the training. It's a wonderful to have a 20 weeks internship with a magnificent company,MRM GROUP OF COMPANIES. Therefore, I consider myself as a very lucky individuals as I was provided with an opportunity to be a part of it. First and foremost, I would like to express my deepest gratitude and special thank En Rusdi Bin Mamat for the opportunity given, to conduct my training in his esteem company. He also who in spite of being extraordinarily busy with his duties, took time out to hear, guide and keep me on the correct path that allowing me to carry out my project at their esteemed organization and extending during the training.n record. I am also want to thanks to the team professionals comprising of En Hafizudin Wahab, Cik nur mariani for taking part in useful decision & giving necessary advices and precious guidance which were extremely valuable for my study both theoretically and practically. It is honour for me to be given the opportunity to 'work' with you all.

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

ABSTRACT

Guideline for construction of superstructure is very important thing to know and elaborate, therefore this report will discuss the process of construction superstructure and problem faced to ensure the quality and specification acceptable in construction industry. This report will discuss about superstructure of the building. This report was conducted for The Construction of two Storey Bungalow House at Lot 7310 (Gm 1301), Mukim Pengadang Buluh, Daerah Kuala Terengganu, Terengganu that owned by En Fuad. The objective of this report is to compare the content of two educational buildings and how far it fulfills the requirements in the guideline. It occupants. To illustrate the function of building structure as an important aspect to focus on building design achievement and then to evaluate how far the potential of the building structure that could fulfill the building criteria that is prescribed by the requirements in the guideline based on standard specification. This report also will provide things to be considered for construction following the company guideline.

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CHAPTER 1.0

INTRODUCTION

1.1 Background of Study

Industrial training is the basis of work experience undertaken during a program of study that is highly relevant to the professional development of students. Industrial training can also give students the opportunity to experience a working environment throughout the semester. Their own choice companies can also learn something new from the industrial training program and hope to give students more opportunity to study at the workplace to gain more experience and improve the unmet knowledge on campus.

Provide exposure and provide student experience in the development of latest technologies, effective communication, teamwork practices, policies, procedures and regulations, professional perspectives among students and enhancing confidence levels to excellent coaches.

Overall, this program can be done either in government or private organizations. It also aims to familiarize future graduates in the work environment with the responsibility of completing all the work given

1.2 Objectives

There are several objectives have been developed from this construction as follow;

i) Expose the student to actual job enviroment

-The student will further learn about their respective field and expand their knowledge. They will be provided with the real job employment experience and be able to handle or adapt in challenges occurs in planning profession
To determine the time of bricklaying wall process

ii) To Improve student skills

Students are able to develop and revise skills in computer technology and digital applications in accordance with the market needs. It will increase the interest in handling works, enhancing creativity and contribute quality ideas to the organization.

iii) Internships will improve student self-confident, responsible person and a good worker the end of the training

Student will get the opportunity to interact with the upper management such as director, consultant and others. The student will be able to associate and discuss with them in a closer way thus gaining the self-confidence within them and make the student more responsibility when do the work. Furthermore, students will be more able to produce a quality work that given.

1.3 Scope of Study

The scope of study has been carried out at Lot 7310 (Gm 1301), and located at Mukim Pengadang Buluh, Daerah Kuala Terengganu, Terengganu . The project had started in 20 September 2021. The construction is a Semi detached Bungalow House and cost Two hundred fifty Thousand Ringgit Malaysia (RM250,000.00). The project is currently on going. Therefore, the focus of the study is to determine on how the Structure of house is made . Furthermore, the problems and solution also included in this study. Even so, the study do not concentrate on the quantity of manpower or labors, the costs and the duration matters. In order to fulfill the data, there were three methods need to be carried out which is observation, interview, and document reviews. In conclusion, all further explanation relating the above method were explained as below.

1.4 Methods of Study

This method have been used to complete this report is as shown below:

I. Interview

Interview the Site Manager and Developer about how the process for construction of superstructures and identifying defect of building.

II. Observation

Observe everyday when at the site and weekly meeting progress about progression and problem faced on site.

III. Internet

To study others way to solve the problem during casting the superstructures.

IV. Books and journals.

Refer some books and guidelines to gain more knowledge about the terms and law on construction site.

CHAPTER 2.0

COMPANY BACKGROUND

2.0 Introduction of Company

MRM Maju Properties Sdn. Bhd is a company registered under the Malaysian Construction Industry Development Board (CIDB)(0120131001-TR152264).This company registered in grade G2 in category B (Building construction) for specialization B04. CE (civil engineering construction) for CE21 and ME (mechanical and electrical) .Apart from being registered under CIDB, this company has SSM Business Registration certificate(. MRM has collaborated with several professional panel companies to meet client demands as well as facilitate all construction matters. The professional panel involved consists of panel of architects, panel of surveyors, panel of engineers and panel of contractors. There are also some general workers and skilled workers who have skills and experience in the fields of wiring, electricity, irrigation and construction. With specialized skills in the construction of bungalows, MRM Maju Properties has been entrusted to manage, plan and build single and double storey bungalows throughout Terengganu. With the recognition from the Malaysian Construction Industry Board (CIDB) as a bumiputera contractor, MRM Maju Properties is able to expand the scope of work to manage and carry out, piping, sewerage and civil engineering work.

2.1 Company Profile

MRM Maju Properties was established and started operating in 2009, and currently active in designing to handling over, closed report with client enables MRM to fulfill every project with time frame. MRM was stand for (Mohd Rusdi Mamat). This company based in Kuala Terengganu located at 485, Tingkat atas, Gong Kapas, Jln Sultan Mohamad, 21100 Kuala Terengganu.

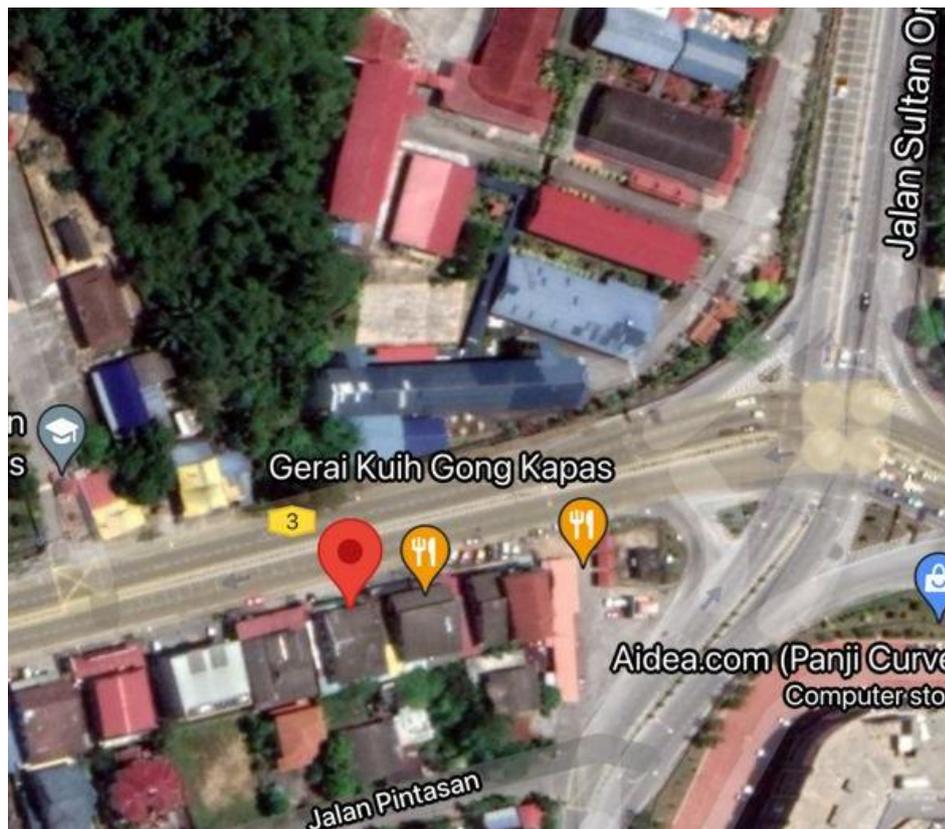
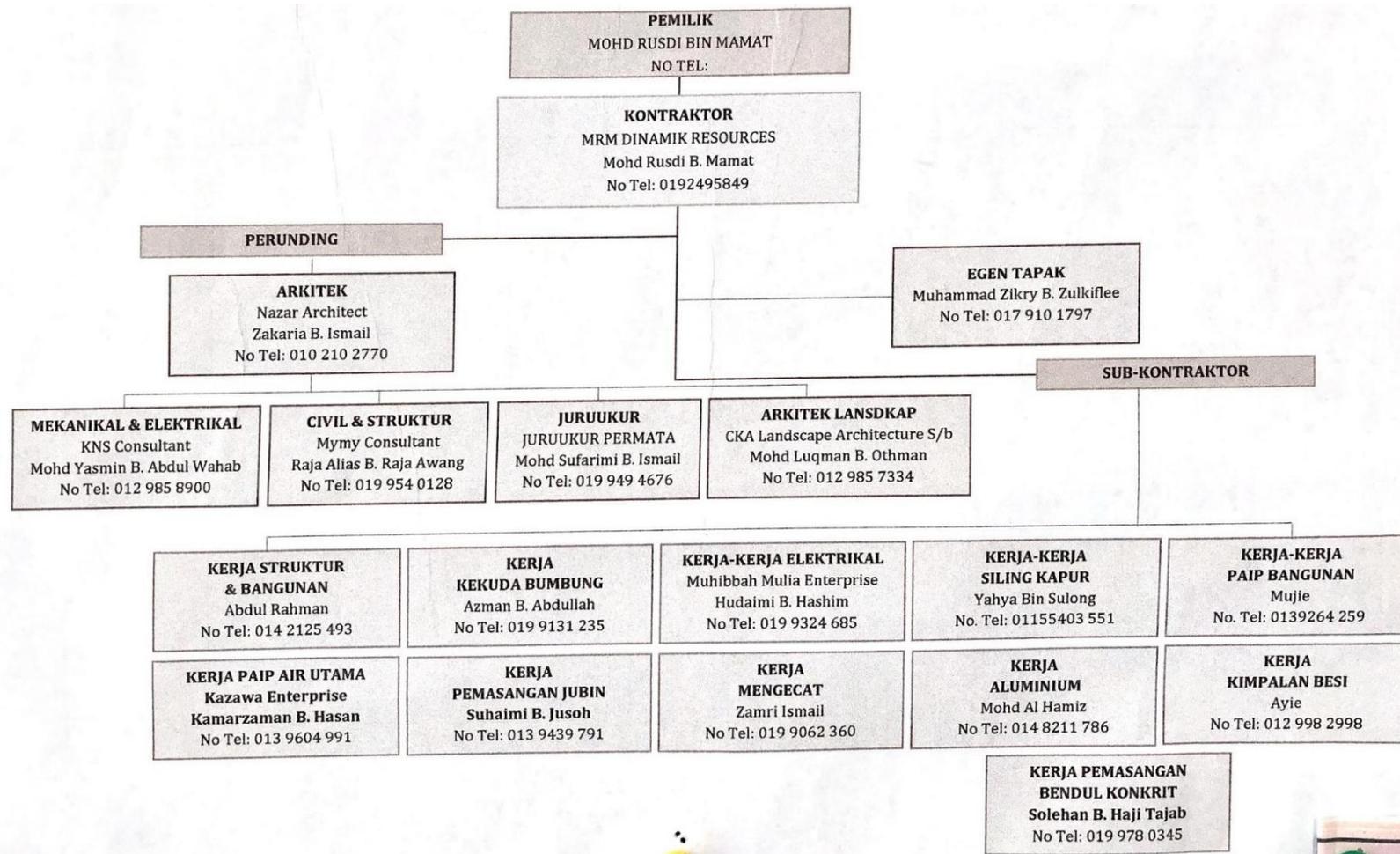


Figure 1 Location of the company based on the satellite map

Source: <https://www.google.com.my/maps>

With the company's mission to aim to deliver each and every project the best services we could. The company has 1 employees and has collaborated with several construction-related companies. MRM Maju Properties can be contacted via company email at rusdi.mrmrdr@gmail.com , Facebook (ByMRMGroupOfCompanies), or directly contact through company number (066226433).

2.1 Company Organization Chart



2.2 List of Project

2.2.1 Completed Projects

No.	Project Title	Project Value	Start Date	Completion Date	Client
1.	Cadangan Membina Dan Menyiapkan Rumah Kediaman 1 Tingkat Jenis kekal Di Atas Lot 30408 Tok Jembal, Mukim Kuala Nerus, Terengganu	RM300,000.00	11/7/2018	31/12/2019	En Nordin bin Mohammad
2.	Kerja-Kerja Merekabentuk, Membina dan Menyiapkan Kotak Acuan Untuk Bongkah Konkrit Bagi Projek Pembinaan benteng Pemecah Ombak Kuala Besut, Daerah Besut , Terengganu	RM285,000.00	1/12/2018	21/4/2019	UZ Land Sdn.Bhd (Main COntractor)

3.	Cadangan Membina Dan Menyiapkan Sebuah RUmah Kediaman Jenis Kekal 1 Tingkat di atas Lot 5483 , Gm 1475, Mukim kuala Berang , Daerah Hulu Terengganu, Terengganu Darul Iman	RM220,000.00	12/7/2019	12/1/2020	Pn. Wan Kuntom Bt. Wan Muda
4.	Cadangan membina dan Menyiapkan Sebuah Rumah Kediaman Jenis Kekal 2 TIngkat di Atas Lot 14069 (HSM11124),Paya Dusun, Mukim Sura, Daerah Dungum, Terengganu Darul Iman	RM 620,000.00	1/3/2019	1/9/2020	Pn Rosnida Bt.Mohd Nor
5.	Kerja Kerja Pengubahsuaian Rumah Berkembar 2 TIngkat Di ATas Lot PT41055, HSM 687, Paya Gucher, Mukim Kuala Nerus, Daerah Kuala Nerus, Terengganu Darul Iman	RM 67,000.00	13/6/2020	1/8/2020	En Hisyamsani B. Idris

2.2.2 Project in Progress

No.	Project Title	Project Value	Start Date	Completion Date	Project Duration	Client
1.	Membina dan Menyiapkan 1 unit Banglo Berkembar 1 Tingkat Di atas Lot 7310 (Gm 1301), Mukim Pengadang Buluh, Daerah Kuala Terengganu, Terengganu	RM250,000.00	6/9/2021	-	-	En.Ahmad Fuad Bin Ibrahim
2.	Membina dan Menyiapkan 1 unit Banglo 1 Tingkat Jenis Kekal DI Atas Lot 52235 (PM 661), Kg. Darat Tok Wil, Mukim Merang ,Daerah Setiu , Terengganu Darul Iman	RM224,625.00		-	-	Pn. Suraya Bt. Ramli
3.	Projek cadangan Membina & Menyiapkan 4 unit Rumah kediaman berkembar 1 Tingkat jenis kekal di atas lot 80454(Gm16753 & 80457 (GM16753) & kerja-kerja infrastruktur berkaitan, Alor Ja, bu, Terengganu darul Iman	RM900,000.00	-	-	-	-

CHAPTER 3.0

CASE STUDY

1) Introduction to Case Study

The case study is about construction process of semi d storey house. The project where has started the construction in 20 september 2021. The cost of construction approximately two thousand hundered and fifty Ringgit Malaysia (RM 250,000.00). Currently, the project progress is still on going. Thus, the study will be explained not only regarding installation but including the machinery and tools, the time that have been carry out and the problem and solution of the construction. Nevertheless, the study do not concentrate on cost matters and manpower. The site location took place at the Lorong lorong kampung laut , Kuala terengganu, terengganu



Figure 2 Location of site based on the satellite map

Source:<https://www.google.com.my/maps/@>

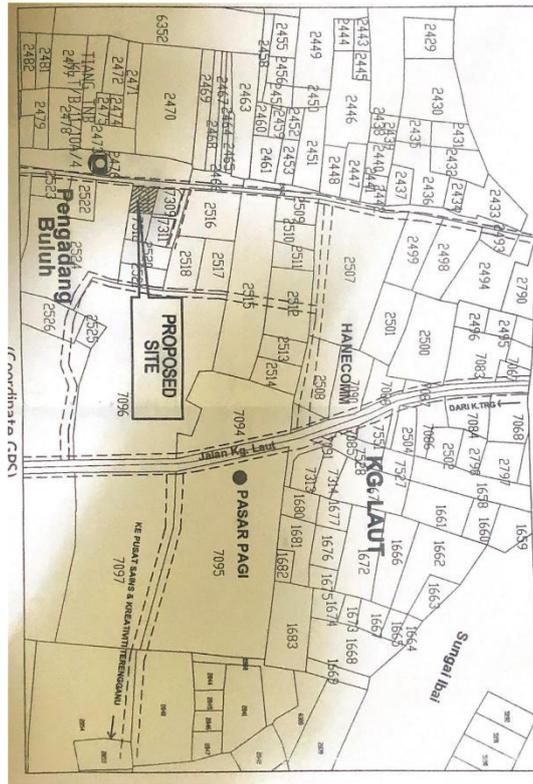


Figure 3 The location, site and key plan of the project

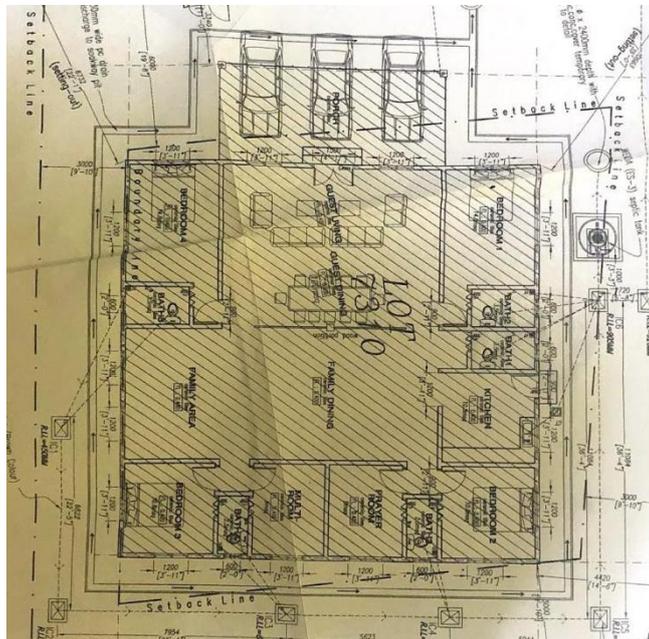


Figure 4: Floor Plan

II) Procedure for Concreting Superstructure

III) Design of Formwork



Figure : 5 design of formwork

- a. The design of formwork and its construction shall be the sole responsibility of the Contractor. It shall include all moulds for forming the concrete and all temporary construction for the proper execution of the work. The design shall be submitted to the Engineer for approval before construction work commences.

- b. Formwork shall be fixed in perfect lines, grades and dimensions, with no crevices at joints. It shall be securely braced, supported and wedged so as to retain its position without displacement or deflection during the placing and compaction of concrete. All joints shall be either horizontal or vertical, unless otherwise required.

c. Care should be taken, when re-using formwork, that its surface shall be smooth and clean and that it shall be free from warping twisting or other deformation. Any formwork, which has in the opinion of the Engineer deteriorated sufficiently to render it unsuitable for the work shall be rejected and must be removed from the site within 48 hours or must be broken up a once, and new formwork to be provided at the Contractor's expense.

IV) Installation of pipework

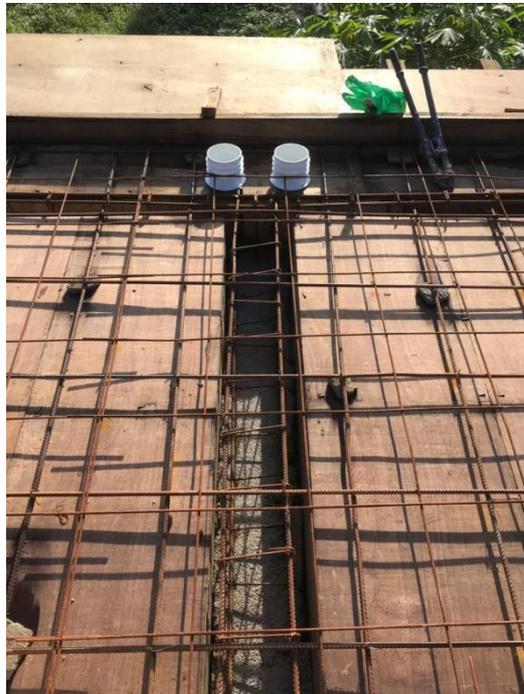


Figure : 6 photo of pipe

- a. Piping shall be installed so that it follows the lines of the building structure and horizontal piping shall be graded wherever necessary to allow for venting and draining of the pipework.
- b. All pipe fittings shall be of the correct size. Changes in diameter shall be by means of reducers. Bushing down will not be permitted.

V) Fixing Reinforcement Bars



Figure 7 Fixing the BRC

- b. The reinforcement shall be fixed accurately and securely in position so that the reinforcement is in the correct position in relation to the formwork to give the specified concrete cover and will not be displaced due to trafficking around site or during the placing and compaction of the concrete or any related operations.



Figure 8 Types of Spacing

c. The correct cover shall be maintained by the use of spacers or other approved means. Concrete spacing blocks is approved for use. Concrete spacers should be comparable with strength, durability and form to the surrounding concrete. Spacers fixed are to parallel the reinforcement bars that cannot be located in a line across a section Timber, stone or metal spacers are not permitted.

d. Starter bars to columns and walls must be securely fixed to the reinforcement in the parent concrete and accurately located to maintain the specified cover. Reinforcement embedded in hardened concrete shall not be bent.

VI) Construction of Column



Figure 9 column

Columns are the primary vertical elements in a structural building. Characteristics of columns are can be extend to one story or can connect to many stories and transferring loads downward. Deterioration in columns results from overloading, impact, abrasion, or seismic actions.

Concrete columns support compressive loads. Due to the monolithic placement of floors and columns, columns are also subject to a bending force known as moment force. To counteract this force, lateral steel reinforcing ties are used to hold vertical bars in place and provide lateral support. Spiral ties are also used to provide lateral support in columns because columns play such a crucial role in the support of the structure, tier integrity must be maintained.



Figure 10 Inspection the vertically before concreting

A) Things to be considered on construction column

1. Setting out line mark by Main Con 500mm from gridlines for both side of brickwall upon completion of floor slab.
2. Make sure the vertically of the column. To plumb corner column and pull string to all edges and party wall.
3. Make sure the size, quantity and arrangement of reinforcement and the link are follow the engineer design.
4. Make sure concrete cover is according to Engineer requirement. Use plastic wheel spacer.
5. Additional of floor height of 2 inch to allow for floor finishing work. (Ground floor/first floor power float finishes with flat sheet ceiling).
6. Additional of floor height of 5 inch to allow for plaster ceiling at last level with tiling works.
7. Ensure the starter bar for each column is sufficient. (46 x diameter).
8. The formwork for column should follow the design in drawing. Use screw and nut system to ensure formwork is well tied if the column is big (usually < 300).
9. Dowel bar for brick work should be install interval of 2ft.
10. Do not forget to allow pipe sleeve opening for plumbing and electrical work.
11. To put poker in the column.
12. Removal of column formwork = minimum 48 hours.
13. To mark CFL + 1.0m for all columns after concreting.

VII) Pouring Concrete



Figure 11 Concretor is pouring the fresh concrete

- a. For assessment of strength, a sample shall be taken from a randomly selected batch of concrete by taking a number of increments in accordance with BS 1881. The samples, whenever practicable, shall be taken at the point of discharge from the mixer or in the case of ready mixed concrete, the point of discharge from the delivery vehicle. 4 test cubes from each sample shall be prepared and cured in accordance with BS 1881. The placing of concrete shall not begin until all equipment necessary for testing are available and are acceptable to the Engineer.
- b. Concrete shall be transported, placed and spread by approved means and in such a way as to prevent segregation. Concrete not placed within 90 minutes of adding water to the mix or before starting its initial set shall be rejected, unless an approved retarding admixture is used.
- c. Concrete must be carefully and thoroughly compacted during placing to ensure that it completely surrounds the reinforcement fills the formwork and excludes voids. While casting, all concrete should compacted using the vibrators.

VIII) Stripping of Formwork



Figure 12 Stripping of formwork

- a. Formwork should be removed without cause any damage to or overstress in the concrete. Formwork should not be removed before the concrete has sufficiently set and hardened.

IX) Construction of Beam



Figure 13 Formwork of beam

A beam is a structural member which spans horizontally between supports and carries loads which act at right angles to the length of the beam. The width and depth of a typical beam are “small” compared to their span. Generally, the width and depth of are less than 10 cm.

Usually, a beam is exposed to two sets of external forces and two types of internal forces. The external loads are the loads applied to the beam and reactions to the loads from the supports. The two types of internal force are bending moments and shear forces. The internal shear force and the internal bending moment can be represented as pairs of forces. The Figure below shows a Typical Beam with Internal and external forces acting on it.

A) Things to be considered on construction beam

Ground beam

1. Determine the location of ground beam.



Figure 14 Installation of beam

2. All formwork need to apply with a layer of used oil plus diesel before using
3. Lean con is to be laid before installing reinforcement. Make sure column stump is free of lean con and dirt. Do sloping down where necessary.
4. Make sure the reinforcement and the link are as shown in C&S Engineering drawing.
5. The formwork should be strut properly and free from gap to avoid concrete leakage during concreting work.
6. Ensure that the spacer block are apply before pouring the concrete.
7. Counter check the right angle for building. To provide drop area for car porch, toilet etc.
8. Do not forget to allow pipe sleeve opening for building and electrical work.
9. To install stiffener as per drawing.
10. For beam next to perimeter apron/car porch install starter bar to prevent cracks to apron.
11. Ground slab to sit on top of full ground beam size for suspended slab (depends on engineer's approval). Propose Y10 @ 300c/c.
12. Ground beam width tolerance allowance-5mm.

Roof beam



Photos 15 Installation of formwork for roof beam

1. Make sure the roof beam are levels.
2. To consider allowance for ceiling and tiling. Normal case is 125mm allowance for roof beam. For high rise construction normally do not practice allowance.
3. To install stiffener for roofing work and future brickwork purpose.
4. Never miss out all coping for architectural design.
5. Removed all formwork and strut at gutter area during concreting and proper patching to prevent leakage.
6. Make sure cleaning work is carried out at ground/first floor slab after concreting roof beam.

X) Construction of slab



Figure 16 Concrete pouring

Concrete slabs are form for roof and floors of reinforced concrete buildings. Usually, slabs will be designed to act as diaphragms to transfer horizontal loads to the structural frame. Slabs are often reinforced with welded wire fabric, but can also bond directly to a steel deck. The deck is supported by joists, which may be open web steel joists or concrete.

Slabs transfer loads in either one or two directions. A one-way slab is usually longer than its spanning width. The load will flow perpendicular to the long axis. Two-way slabs are roughly square in plan, and the load is dispersed along both axes.

A) Things to be considered on construction slab

1. Make sure pre order materials such as BRC cut to size, scaffolding, U head, Jack base and formwork. Scaffolding, U head and Jack base must mark with blue paint to avoid theft.



Figure 17 Surface should be clean before concreting

2. Make sure the size, quantity and arrangement of B.R.C follow the engineer design. (Short span and long span is placed accordingly)

3. Ensure the slab are level. Additional of floor height of 2 inch to allow for floor finishing work

Make sure all drop area are allowed. (Toilet drop should add 1 inch to allow tiles lay to fall).

Toilet and gutter area NOT ALLOW usingspaces Block. Must use steel bar chair to prevent leakage.

4. The formwork for slab should be strong enough and can support the concreteload. Check all prop and scaffolding bracing properly install.
5. Never miss out all coping for architectural design to avoid TO. Determine location of stiffeners (if additional is required).
6. Formwork for toilet and drops area, size must be slightly bigger fromarchitectural dimension.

spaces Block. Must use steel bar chair to prevent leakage.

7. The formwork for slab should be strong enough and can support the concrete load. Check all prop and scaffolding bracing properly install.
8. Never miss out all coping for architectural design to avoid TO. Determine location of stiffeners (if additional is required).
9. Formwork for toilet and drops area, size must be slightly bigger from architectural dimension.



Figure 18 the slab construction in progress

The superstructure construction started on 27 September 2021 until 8 December 2021.

27 September 2021 – 5 October 2021



Figure 19: placement of reinforcement and formwork installation



Figure 20 : Removing the formwork



Figure 21 : waste pipe installation

6 October 2021 – 12 October 2021



Figure 22 : fill the space with the sand and use compactor machine



Figure 23 : Termite treatment



Figure 24 : Put plastic sheet under the reinforcement that tie by the wires



Figure 25 : The concreting



Figure 26 : Concrete column construction process

26 October 2021 - 3 November 2021



Figure 27 : Preparing Beam formwork



Figure 28 : Install reinforcement for the beam

17 November 2021 - 24 November 2021



Figure 29: install the reinforcement and fill with the sand



Figure 30 : wires used to tie reinforcement



Figure 31 : Concrete is cast on the reinforcement

18 November 2021 – 24 November 2021



Figure 32 : Staging scaffolding installment



Figure 33 : Formwork installment



Figure 34 : Concrete pouring using crane and readymix concrete

7 December

I was lucky because I got to learn two processes of construction the house roof which is steel and wood. One is at kampung laut and another one is at gong badak..



Figure 35 : Laying of rafter process at Kampung laut, Kuala terengganu



Figure 36: Steel roof construction at Gong badak kuala terengganu

PROBLEM AND SOLUTION

I) Problem honey-comb on structures



Figure 37: Honeycomb defect

Honeycombing is usually found in vertical rather than in horizontal surfaces and can occasionally extend completely through. Honeycomb happened because of bleed water carrying fine aggregates to the surface or the concrete not compacted properly while casting.

Solution

- Honeycomb can cover with mortar paste.
- Make sure the concrete is compacted using vibrators sufficiently

ii) Steel bars coming out from concrete



Figure 38 Steel bar visible out from structure

Steel bars coming out from structure may affect the strength of structure. This defect happened because the barbender not using the spacing.

Solution

- Paste the cement to cover the steel
- Make sure the barbender use the spacing block to make a gap between

CHAPTER 4.0

CONCLUSION

For overall summary of the project, it can be concluded that the work are successfully done, Alhamdulillah. From this internship program give lot of experienced and gain more knowledge about construction the building.

Through experience that I got from construction of superstructure, lot of the knowledge that I learn and discover that all person on site have different responsibilities in completing this project. As a responsible person, it is necessary to ensure that all the given task should complete properly and comply with the standard requirement

The process took around 10 weeks startintg 27september until 8 december . The construction also delayed a weeks because of the weather.

Every problem faced should be discussed with the appropriate person or direct to employers to get the solution to avoid the problem. If the assigned task does not exceed the employer specification, be responsible to solve it and complete it immediately

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