



اَبُو بَكْرٍ سَيِّدِي تَيْكُو لَوِيْن مَارَا
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

NUR SHAZWANA BINTI MISBAHI

2012211774

Entitled

“HALF SLAB PRECAST CONCRETE”

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

Report Supervisor

Pn. Suryani Binti Ahmad

Practical Training Coordinator

Pn. Wan Nordiana Binti Wan Ali

Faculty Coordinator

Dr. Mohd Rofdzi Bin Abdullah

DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

SEPTEMBER 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 Jabatan Kerja Raya(JKR) Daerah Muar for duration of 4 months starting from 12 May and ended 29 September 2014. It is submitted as one of the prerequisite requirements of DBN307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

.....

Name : NUR SHAZWANA BINTI MISBAHI

UiTM ID No : 2012211774

Date : 30 SEPT 2014

ACKNOWLEDGEMENT

Alhamdulillah, all praises to Allah for the strengths and His blessing in completing this report. Special appreciation goes to my project coordinator, En Atzhar bin Yusof, for his supervision and constant support. His invaluable help of constructive comments and suggestions throughout the experimental and thesis work have contributed to the success of this research. Not forgotten, my appreciation to my site engineer, Miss Rasilah binti Abdul Rashid for his support and knowledge regarding this topic. My acknowledgement also goes to all the technicians and office staffs at Jabatan Kerja Raya (JKR) Muar for their co-operations. Since thanks to my lecturer supervisor Pn Suryani binti Ahmad for their guidance, advice and moral support during do this report in successfully. Thanks for their concern in ensure to being success at training time. Not forget, great appreciation go to the rest Practical Training Coordinator Pn Wan Nordiana binti Wan Ali and Faculty's Coordinator Dr. Mohd Rofdzi bin Abdullah. Last but not least, my deepest gratitude goes to my beloved parents, _____ and _____ and also to my siblings for their endless love, prayers and encouragement. To those who indirectly contributed in this report, your kindness means a lot to me. Thank you very much.

Thank you very much

ABSTRACT

Precast concrete work are important on the construction industry. Concrete work divided into two categories. Among these are precast concrete and in situ concrete. The precast concrete elements are columns, beams, floor slabs, staircases and diagonal bracing. Precast concrete is of the highest possible quality, both in terms of strength and durability. This report is basically discussed on half slab precast concrete construction. The objective of this report is to study method of half slab precast concrete construction and to identify problem during construction of half slab precast concrete. The observation was done to observe and survey the construction work especially on concrete work. Engineer and technician also will do the inspection of half slab precast concrete before and after installation was done. It is to ensure the construction will run smoothly.

TABLE OF CONTENT

CONTENTS	PAGE
Acknowledgement	i
Abstract	ii
Table of Contents	iii
List of Tables	v
List of Figures	vi
List of Chart	vii
List of Photos	viii
List of Diagram	ix
CHAPTER 1.0 PREFACE	
1.1 Introduction	1
1.2 Objective	2
1.3 Scope of Study	3
1.4 Method of Study	4
CHAPTER 2.0 COMPANY BACKGROND	
2.1 Introduction	5
2.2 Company Profile	6
2.3 Organization Chart	8
2.4 List of Project	10

CHAPTER 3.0 CASE STUDY	
3.1 Introduction	12
3.2 Project Background	13
3.3 Case Study	15
CHAPTER 4.0 CONCLUSION AND RECOMMENDATION	25
REFERENCES	27
APPENDIX A : Calculation of one way slab and two way slab	
APPENDIX B : Learning process with technician	
APPENDIX C : Site Plan	
APPENDIX D : Roof Plan	

LIST OF TABLES

Table 2.1	:	Completedproject	10
Table 2.2	:	Project in progress	10
Table 3.1	:	Differences of one way slab and two way slab	13

LIST OF FIGURE

Figure 2.1 : Logo of JKR 5

LIST OF CHARTS

Chart 2.1	:	Main organization chart of JKR Muar	8
Chart 2.2	:	Building unit organization chart	9

LIST OF PHOTOS

Photo 3.1	:	Panels of half slab precast concrete	15
Photo 3.2	:	Half slab from factory	16
Photo 3.3	:	Scaffolding for supporting installation	17
Photo 3.4	:	Half slab pieces transported to the installation area by crane	17
Photo 3.5	:	Installation of pieces half slab	18
Photo 3.6	:	Reinforcement bar installed based on drawing	18
Photo 3.7	:	Scaffolding were removed after concrete strength	19
Photo 3.8	:	Half slab panels were transported to site from factory using 4oft long trailer	20
Photo 3.9	:	Half slab precast concrete were install by a crane	20
Photo 3.10	:	Examples of lattice girder	21
Photo 3.11	:	The problem that found on the slab area	24

LIST OF DIAGRAM

Diagram 3.9	:	Lattice girder based on drawing	22
-------------	---	---------------------------------	----

CHAPTER 1

PREFACE

1.0 Introduction

Precast concrete is a construction product produced by casting concrete in a reusable process which is then cured in a controlled environment, transported to the construction site and lifted into place. Precast concrete elements are columns, beams, floor slabs, staircases and diagonal bracing.

The project title is 'Method of Half Slab Precast Concrete Construction'. A half slab precast concrete including a plurality of floor concrete for members and each floor concrete form member being provided with a bottom slab of a long length, in response to the floor concrete form member. A pair of side walls installed upright along each longitudinal edge of the bottom slab, in response to the floor concrete form member. (Maurice Levitt, 2007)

Thereby, each floor concrete form member is arranged so as to be parallel to each other and be tightly connected to the adjacent floor concrete form member, along the direction perpendicular to the longitudinal direction of each floor concrete form member. The height of the side walls other than the side walls on the most outer edge sides of the whole floor concrete form members is set a common height that is smaller than the height of the side walls on the most outer edge sides. (Maurice Levitt, 2007)

1.1 Objective

The objectives of this report are as follows :

- i. To study method of half slab precast concrete construction
- ii. To identify problem may arise during construction of half slab precast concrete

1.2 Scope of Study

“Cadangan Membina Galeri Darurat 3 Tingkat, Sebuah Kafetaria Dan Sebuah Pondok Pengawal Di Mukim Bukit Kepong, Daerah Muar, Johor Darul Takzim”. This project have a two floor. This project are used half slab precast concrete for flooring area. The precast concrete are arrived from factory Fajar Galaxy Sdn Bhd, Lot 24 Seksyen 4, Jalan Balakong Batu 11, Cheras 43200 Selangor. My scope of study is about precast concrete. The elements that's I have done is flooring area. It is a half slab precast concrete. It also more focus on my objective. Among these are to study method of half slab precast concrete construction and to identify problem during construction of half slab precast concrete.

1.3 Method of Study

Many methods that were used to complete this report and all of the methods give some new knowledge in construction sites:

- I. Book
 - Books are used to obtain information for all the specifications for executing any work that includes material management. Books as well as a source of reference for all the information needed in further details.
- II. Internet
 - Internet is the most popular tool for finding information and facts. Information about material management can be accessed more quickly than with other methods. The information in internet was used to support the actual material management done on site.
- III. Observation
 - Based on the personal observations on actual management or material handling on site.
- IV. Interviews
 - Interview method was done by asking expert or people who has an understanding, or directly involved in the material management. In the context of the study, interview and discussion with Project Manager and Site Engineer was done on how the material was actually managed on site.

CHAPTER 2

COMPANY BACKGROUND

2.1 Introduction



Figure 2.1 : Logo of JKR

Jabatan Kerja Raya (JKR) have at each state. Jabatan Kerja Raya (JKR) Muar I have choose for industrial practical training. The main objective from Jabatan Kerja Raya (JKR) Muar will become a world-class service providers and centers of excellence in the areas of Asset Management, Project Management and Engineering for the development of the country's infrastructure is based on creative talent and innovative technology.

Jabatan Kerja Raya has been establish since 1872 and serves as a technical agency of the Government of Malaysia. Jabatan Kerja Raya Malaysia serve implement development projects and infrastructure maintenance to various ministries, department, statutory bodies and state governments such as roads, buildings, technical, electric and transportation to meet national needs.

2.2 Company Profile

History of Jabatan Kerja Raya Muar

Initially, Jabatan Kerja Raya Muar are headed by Datuk Mat Salleh bin Perang. He was assigned to lead the Survey Department, Land and Works Johor. The activities and functions of the Public Works Department Muar start from 10 April 1887 (the date of the Commissioner of Foreign Herald began its work developing Muar Johor Modern).

In 1892, YB State Secretary of Johor had ordered the Watermark Endut turned to Muar to establish a Department of Public Works transferred from the Department of Lands and Surveys. Previously the Watermark Endut is Assistant Superintendent Johor Public Works Department under Mr.Yahya bin Shaaban Al flat into his Superintendent.

Previously JKR Administration, Muar is located at Jalan Sultan Abu Bakar Muar Petri from 1922 until 31/05/1974. JKR Muar has moved to its own building in Jalan Othman Muar Johor present on 01/06/1974. The building was previously a Rest House Muar.

Vision and Mission of Jabatan Kerja Raya Muar

VISION

- “We will become a world-class service providers and centers of excellence in the areas of Asset Management, Project Management and Engineering for the development of the country’s infrastructure is based on creative talent and innovative technology”

MISSION

PWD’s mission is to contribute to national development by:

- Helping our clients realize the basic information and delivering services through collaboration as a strategic partner
- Standardized our processes and systems to deliver results consistent service
- Providing asset management services and effective and innovative projects
- Strengthen existing engineering competency
- Developing human capital and new competency
- Upholding integrity in service
- Building a harmonious relationship with the community
- Preserving the environment in the delivery of services

2.3 Organization Chart

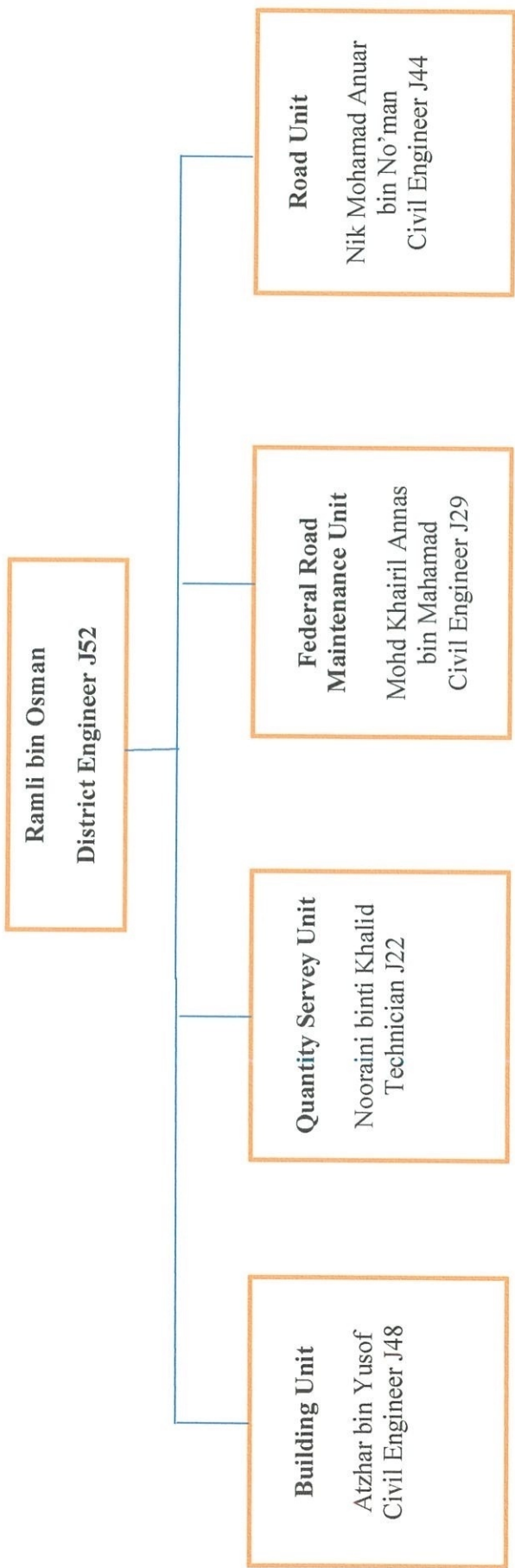


Chart 2.1 : Main Organization Chart of JKR Muar

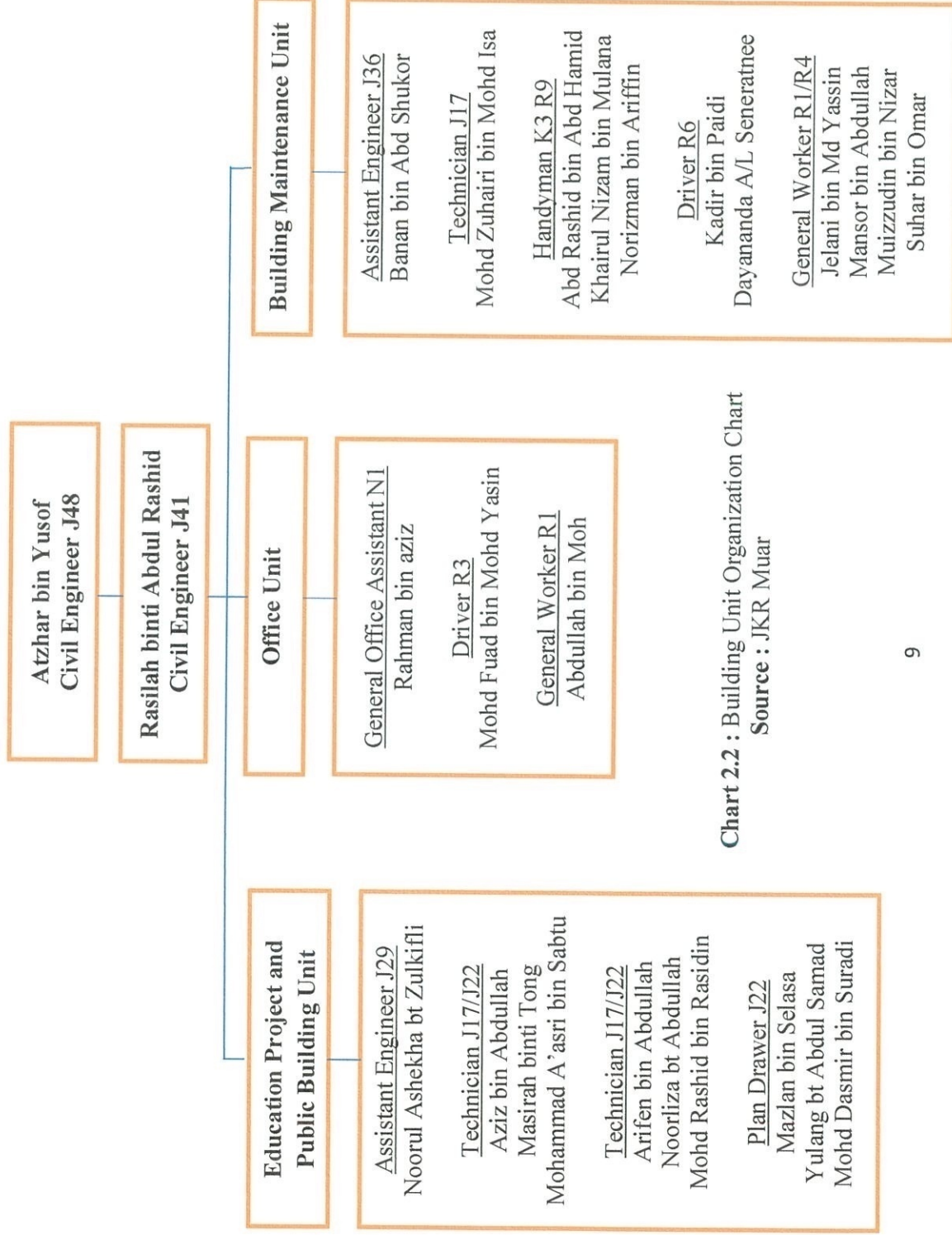


Chart 2.2 : Building Unit Organization Chart
Source : JKR Muar

2.4 List of Project

Completed Project (2014)

Project Title	Contractor	Contract Value (RM)	Completed (%)
Kerja-kerja pembaikan cerun dan lain-lain kerja berkaitan di IKBN Pagoh, Muar Johor	Aliah Enterprise	2.8 million / 2.3 million	100

Table 2.1 : Completed Project

Source : JKR Muar

Project in progress (2014)

Project Title	Contractor	Contract Value (RM)	Completed (%)
Membina dan menyiapkan kerja-kerja tertinggal untuk sebuah (1) bangunan masjid jamek (1) tingkat jenis lantai gantung dan lain-lain kerja yang berkaitan di masjid jamek Parit Tengah 'C' Batu 18, Air Hitam Muar, Johor	HFZ Bina	821,158.00	92
Membina dan menyiapkan sebuah (1) bangunan masjid dua (2) tingkat lantai gantung dan lain-lain kerja berkaitan di	Karisma Mutlak Sdn Bhd	2,148,818.88	20

masjid Kpg Tui, Muar Johor			
Cadangan Membina Galeri Darurat 3 Tingkat, Sebuah Kafetaria Dan Sebuah Pondok Pengawal Di Mukim Bukit Kepong, Daerah Muar, Johor Darul Takzim.	Muda Mekar Sdn Bhd	13.5 million / 7.5 million	90

Table 2.2 : Project in Progress

Source : JKR Muar

CHAPTER 3

CASE STUDY

3.1 Introduction

The precast construction techniques is divided into two categories. Among these are full precast construction techniques and the half precast techniques. In the full precast construction techniques, the whole precast member is manufactured as a precast structure. And for the half precast construction techniques, a part of a precast member is manufactured at a factory or at the site as a precast structure, and the remaining part of the member is manufactured at site by installing concrete into the precast structure brought in the site. (Wikipedia, 2014)

In general, in applying the half precast construction techniques to a floor structure, the part that corresponds to the floor concrete form in a case of the cast in – situ concrete is previously manufactured as a half precast floor structure at a factory. The manufactured half precast slab is conveyed to the site and each end side of the half precast slab is placed on a beam. After the arrangement of the reinforcing bars as needed is performed in the space over the half precast slab, concrete is installed into the space over the precast slab. (Wikipedia, 2014)

3.2 Project Background

“Cadangan Membina Galeri Darurat 3 Tingkat, Sebuah Kafetaria Dan Sebuah Pondok Pengawal Di Mukim Bukit Kepong, Daerah Muar, Johor Darul Takzim”. This project have a two storey. For a ground floor, it used a in - situ concrete for floor area. Then, first floor and second floor used a half slab precast concrete. Every floor have a difference size (length and width) of slab concrete used. It will show on plan layout. But, for every floor it is have a same thickness of slab. It is a 150 mm of thickness slab. It also can show on the plan layout.

It also have a two types of structural slab on the project. Among these are one way slab and two way slab. One way slab is supported on two opposite side only thus structural action is only at one direction. Total load is carried in the direction perpendicular to the supporting beam. If a slab is supported on all the four sides but the ratio of longer span (l) to shorten span (b) is greater than 2, then the slab will be considered as one way slab. Because due to the huge difference in lengths, load is not transfer to the shorter beams. Main reinforcement is provide in only one direction for one way slab.

There are some basic difference between one way slab and two way slab. Among these are shown below :

One way slab	Two way slab
One way slab is supported by beams in only two sides	Two way slab is supported by beams in all four sides
The ratio of longer span panel (l) to shorter span panel (b) is equal or greater than 2. Thus, $L/B > 2$	The ratio of longer span panel (l) to shorter span panel (b) is less than 2. Thus, $L/B < 2$
Main reinforcement is provided in only one direction for one way slabs	Main reinforcement is provided in both the direction for two way slabs

Table 3.1 : Differences of one way slab and two way slab

Source: JKR Staff

Contract Information

Contract Title : “Cadangan Membina Galeri Darurat Muzium Polis, Di Mukim Bukit Kepong, Daerah Muar, Johor Darul Ta’zim”

Contract No : PERS/KK(3)2332/25-2013)

Contractor : Muda Mekar Sdn Bhd

Address : No.867, (Tingkat 1), Km 5, Jalan Buloh Kasap, 85000 Segamat, Johor

Class : G6

Date of possession of site : 03 September 2013

Original completion date : 24 November 2014

Original cost contract : RM 7,510,000.00

Insurance :

Performance Bond : RM 375,500.00

Public Liability Policy : RM 500,000.00

Insurance Policy For The Work : RM 7,510,000.00

3.3 Case Study

3.3.1 Half Slab Precast Concrete



Photo 3.1 : Panels of half slab precast concrete

Precast concrete is first poured concrete at the construction site or made in a factory. Hardened concrete has been completed will be brought to the construction site to continue to be installed. Usually the precast concrete is brought to the construction site at certain stages, and it was built very quickly without the installation of molds, steel reinforcement, concrete mixing and transportation to the site. Precast work carried out usually at places that supply materials and talent available.

Half slab precast concrete method of constructing suspended concrete slabs involved a combination of precast reinforced concrete panels incorporating lattice girders and poured in-situ concrete topping. According to the half precast construction techniques , the wood form needed in structuring the slab in the site can be dispensed with the advantage inherent in the precast construction technique can be made. Further, the choice of the half precast structure, the easiness regarding the component conveyance and installation can be achieved.

A half precast slab including a plurality of floor concrete form members and, each floor concrete form member being provided with a bottom slab of a long length, in response to the floor concrete form member . A pair of side walls installed

upright along each longitudinal edge of the bottom slab, in response to the floor concrete form member.

Thereby, each floor concrete form member is arranged so as to be parallel to each other and be tightly connected to the adjacent floor concrete form member, along the direction perpendicular to the longitudinal direction of each floor concrete form member. The height of the side walls other than the side walls on the most outer edge sides of the whole floor concrete form members is set at a common height that is smaller than the height of the side walls on the most outer edge sides. (Wikipedia, 2014)

3.3.2 Types of cast

Concrete slabs come in variety of forms, which can be divided into two categories. Among these are precast and in situ. It depends on where the concrete was cast. Wherever the concrete is cast it may be reinforced or pre stressed. Reinforced concrete uses steel bars to resist the tension in the slab. The pre stressed concrete has high strength steel strand cast in it which compresses the concrete and maximizes the benefit of concrete compressive strength.

3.3.3 Method Statement for the installation of half slab

The method statement of the installation half slab precast concrete are as follows :

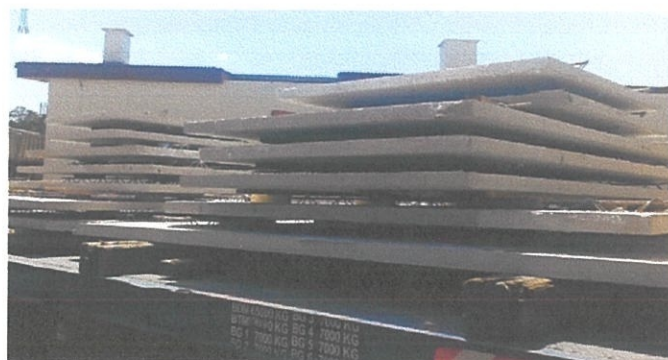


Photo 3.2 : Half slab from factory

Firstly, check the level of the half cast beam and ensure that the finish level of the beam as per design. The contractor shall submit a proper method statement to rectify the non uniform beam level or when the top cast beam level are inconsistent in its level. Secondly, remove loose concrete or laitance using a appropriate tools.

Thirdly, check the half slab against any cracks, cracked half slab shall be marked and re-inspect by consultant approved half slab to be rectify and install. While rejected half slab to be disposed at the contractor's dumping site.



Photo 3.3 : Scaffolding for supporting installation

After that, arrange for the scaffolding in the respective panel of concern as per scaffolding arrangement for half slab support. Use a proper tools to ensure that the top level of scaffolding is at the same level.



Photo 3.4 : Half slab pieces transported to the installation area by crane

Then, lift the half slab using appropriate lifting machinery and tools then slowly place the half slab on the scaffolding. Half slab pieces were transported by crane to the installation area.



Photo 3.5 : Installation of pieces half slab

Next, ensure that the minimum bearing distance of the half slab seats on the beam

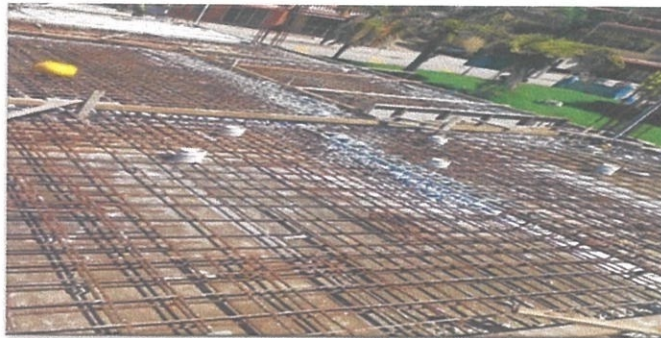


Photo 3.6 : Reinforcement bar installed based on drawing

Next, place reinforcement on the half slab and tied properly as per spacing stated in the drawings.

Then, close the gap between the half slab and beams with approved sealing material or formwork. Have a few type to close the gap on the slab. The first type if the gap are less than 3 mm masking tape will be use, if the gap 3 mm to 20 mm

cement mortar will be use and the last type are temporary timber formwork will be use if the gap is more than 20 mm.

After that, pour and spread the concrete over the whole slab area and compact using poker vibrator

Then, cover the top slab with gunny sacks and wet them using portable water or any other appropriate curing method.



Photo 3.7 : Scaffolding were removed after concrete strength

Lastly, the scaffolding placed at the lower level shall only be removed after 21 days after slab concreted.

3.3.4 Loading and unloading

Half slab panels will be transported to site from factory using 40ft long trailer. Each trailer will be delivered about 20 panels of average size 2.4 m x 4 m. The panels will be stacked as shown in diagram. The panels for each stack will be used to unload from the trailer.

After arrived on the site, half slab precast concrete were install by a crane. Crane is a type of machine, generally equipped with a hoist, wire ropes or chains and sheaves. So that can be used both to lift and lower materials and to move them horizontally. It is mainly used for lifting heavy things and transporting them to other places. Cranes are commonly employed in the transport industry for the loading and

unloading of freight, in the construction industry for the movement of materials and in the manufacturing industry of the assembling of heavy equipment.

Precast members can withstand farther hauling and rougher treatment than either plain or reinforced members. All members require adequate support so that they do not undergo either strain or loading greater than the design loading. Various types of hauling and handling equipment are needed in precast concrete operations.



Photo 3.8 : Half slab panels were transported to site from factory using 40ft long trailer, Bukit kepong



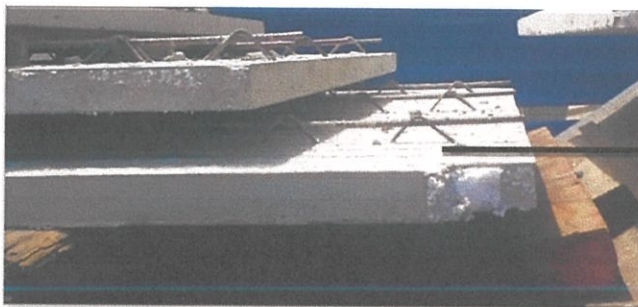
Photo 3.9 : Half slab precast concrete were install by a crane, Bukit Kepong

3.3.5 Propping

A lattice girder is a type of girder with a criss-crossed web design, such as in gardening lattices, between the two edges of the girder. The diagonal lines of steel give support in all direction, helping to prevent the girder, which is one of the main support elements in a bridge design, from bending. Often seen on older bridges or buildings, lattice girders are also widely used in mining tunnels for roof support during excavations and can be erected quickly.

Lattice girder are also used as a component to provide structure load bearing support for floors that will handle heavy loads. They are used to create what are called lattice girder slabs for high capacities. In curving wall design, their surfaces can be bonded with polystyrene void-formers to reduce wall weight loads. A lattice girder can be a component in accommodating large arched openings when using these void-formers, due to the reduced weight load. (Wikipedia, 2014)

The precast panels will be designed as propped which will be indicated in our designed submission. Lattice girders spacing will be designed as 100 mm c/c.



Lattice girder
Spacing :
100 mm c/c

Photo 3.10 : Examples of lattice girder

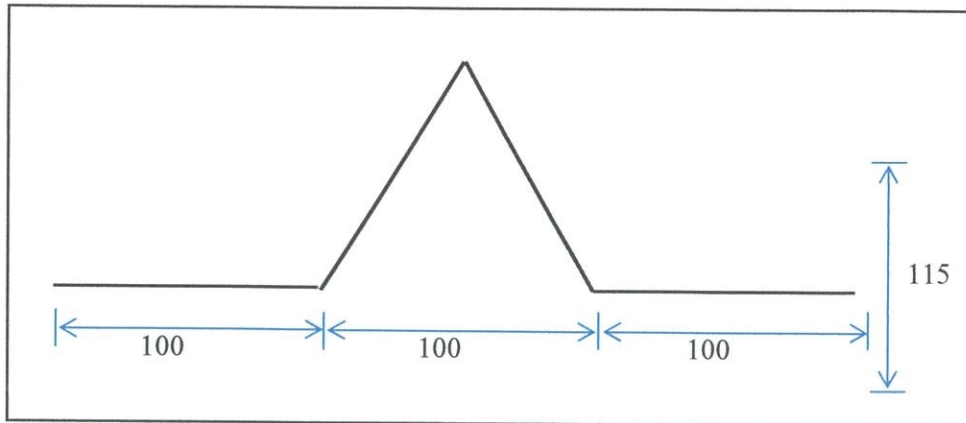


Diagram 3.1 : Lattice girder detail based on drawing

3.3.6 Sealing of Gap

After the slabs have been installed, the conceal piping top reinforcement will be laid. Before concreting, all the gaps will be sealed.

- i. Less than 3 mm gap – masking tap will be used
 - If the gaps is less than 3 mm, it can using a masking tape for seal the gap. The method of using the masking tape are firstly use the masking tape as a appropriate in terms of design, size, type and others for the gap. Then, paste the masking tape at the gap. This way is easily to install.
- ii. 3 mm to 20 mm gap – cement mortar
 - If the gap is 3mm to 20mm, it use a cement mortar for the sealing of gap. The method of using the cement mortar is firstly mix the mortar. Cement and sand are using for mixing the mortar. The mortar mixture ratio that used is 1 : 4. After mortar already mixed, put the mortar in the area that there is a gap in the floor.
- iii. More than 20 mm gap – temporary timber formwork

- If the gap that have on the floor is 20 mm, it using a temporary timber formwork for sealing the gap. The method of using the temporary timber formwork is firstly the timber were made prefer to the size of gap. After the formwork already built, install the formwork at the gap that have on the floor area. After formwork were ready install at the gap, put the concrete right there. After few days, formwork was dismantle after the concrete ready strong.

3.3.7 Problem during construction of half slab precast concrete



Photo 3.11 : The problem that found on the slab area

Precast concrete is a building material that is easily available and easy to implement installation. Precast concrete is first poured concrete at the construction site or made in a factory. Hardened concrete has been completed will be brought to the construction site to continue to be installed. Besides having a many advantages of precast concrete, it also has its own disadvantages. It is because the problems that founds on the project during the installation of half slab precast concrete.

Among the problems that have on the project is the precast that arrived on the project can't be installed correctly on the floor area. The problem is caused by the factory has a distinctive dimension to make precast. Not all the clients ask dimension can be created by the factory. Precast size depends on the size of the factory precast can do. Therefore, the factory will send precast dimension closest to the size of the slab that the client requested. Because of that, precast coming to the site having

This problem is solved by doing the cutting concrete section is not applicable. The workers have reshaped according to the size of the precast is right on the surface of the floor. For a quick process to reshape of precast, this work should be done by a skilled labor. This problem is also solved using an appropriate concrete cutting machine. For each precast, the time taken to re-establish the size of precast exact size will depends on the size of the precast. If the size of each precast is large, then the time taken to re-establish the precast is long. Whereas, if the size of precast is small, then the time taken to re-establish the precast is short.

Lastly, in the connection of structure process will have a problem in many aspect such as water, weather, corrosion and method of construction. Due to this problem, the time allocated for the installation of a half slab for only few days has been a long time. This is also one of the causes of the delay time for the project.

3.3.8 Advantage and disadvantage

Precast concrete are famous used on the construction site. It is have their own advantage and disadvantage.

The advantage is the every units of precast concrete can produce accurate and uniform because all work mixing, placement and curing of concrete can be carried out under the control of factories. Next, every design are used repeatedly can be reduce cost with the molds used must be made smoothly and meet the required quality. Lastly, the framework installed using a skilled labor or semi-skilled labor. Thus, the rate of labor force working capital is readily available to provide training in a short time.

The disadvantage is the building system are not easily changed in terms of design concept which are too broad selection of existing system and the design is made without many changes in terms of key concept. Next, all planning should be done under control and unloading work can be carried out easily. Lastly, in the connection of structure process will have a problem in many aspect such as water, weather, corrosion and method of construction.

CONCLUSION

Precast concrete construction method is different with the conventional construction method of concrete in - situ structural construction. For the construction of concrete structures in - situ, each element of the structure being built must have the basic elements first. While for precast concrete construction, each element can be provided concurrently either on site or in a factory and then assembled and connected on the construction site.

Half slab precast concrete are combination of precast reinforced concrete panels incorporating lattice girders and poured in-situ topping. Half slab precast concrete will ensure the project and construction works will be done smoothly and more systematic. Half slab installation need to be correct and systematic besides ensure the construction period running smoothly.

RECOMMENDATION

For half slab precast concrete, the factory will make a precast according to dimension and size specified based on the factory. The orders from the contractor for the half slab precast concrete must follow the dimension set by the factory. This is because the parties of factory are not necessarily going to be able to meet the tastes of the client.

Due to the size of the factory made precast has its own dimension, so the charge should be an important part in the preparation of drawing and specification slab to be used on the project. For the providing accurate drawings is one important thing to make sure of a construction can be carried out properly and systematic.

Drawing preparation for half slab size should be according to the dimension of the already existing factory. Thus it can be ordered according to the size appropriate to the size of the floor at the site.

By this way, the problem that has on the site can be avoided. Besides that, the progress and process of installation of half slab precast concrete in construction also can be more systematic and organized. So extension of time, over budget and overlook process can be reduce and avoid.

REFERENCES

a) Book

- i. Kim S. Elliott, 2002, Precast Concrete Structure, United Kingdom.
- ii. Kim S. Elliot, 2002, Precast Concrete in Mixed Construction, Convenor United Kingdom.
- iii. Maurice Levitt, 2007, Precast Concrete (Materials, Manufacture, Properties and Usage), Madison Ave New York.

b) Wikipedia

- i. NA (ND), Wikipedia: Half Slab, Retrieved on 30 August 2014, 11am
<http://www.scribd.com/doc/88464502/half-slab>
- ii. NA (ND), Wikipedia: Half precast slab and method for structuring half precast slab, Retrieved on 05 Sept 2014, 10am
<http://www.google.com/patents/US20110146190>

c) Interview

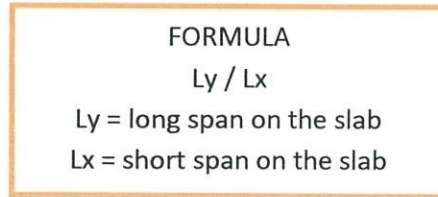
- i. Miss Rasilah binti Abdul Rashid, Assistant Engineer JKR Muar
- ii. En Atzhar bin Yusof, Engineer JKR Muar
- iii. Technician and staff JKR Muar

d) Drawing

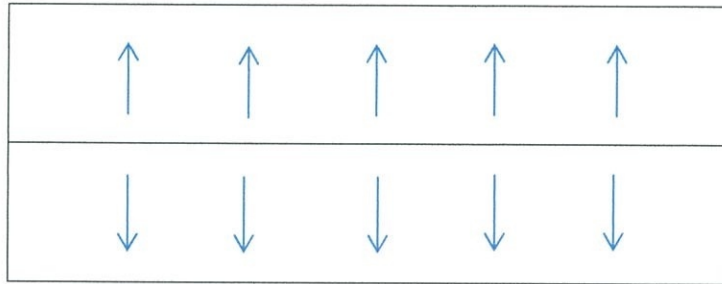
- i. Layout plan of “Cadangan Pembinaan Galeri Muzium Polis Bukit Kepong Muar, Johor Darul Ta’zim”

APPENDIX

The calculation types of structural slab

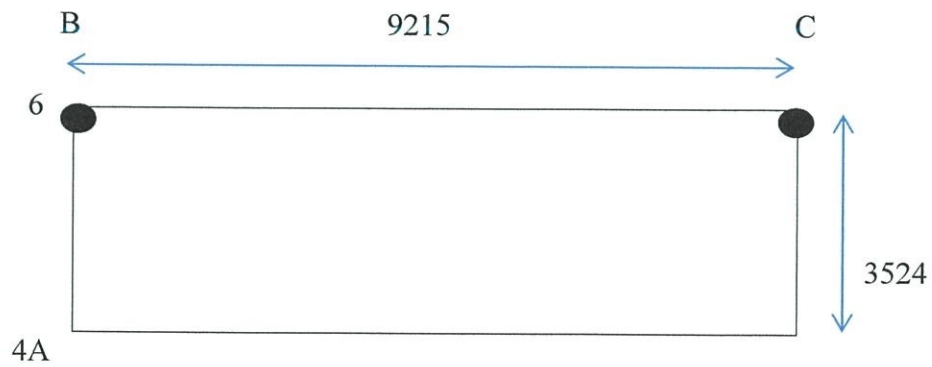


I. One way slab



Example from second floor slab layout plan :

Grade B – C / 4A – 6



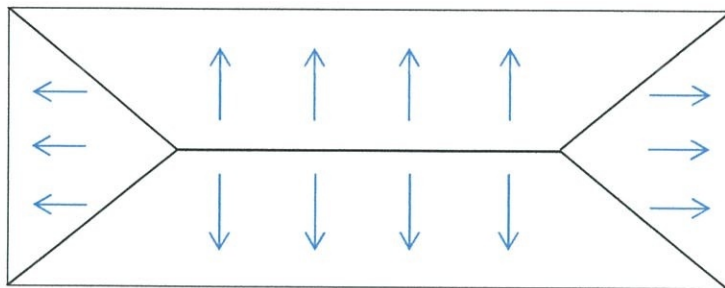
Solution:

$$L_y / L_x$$

$$= 9215 / 3524$$

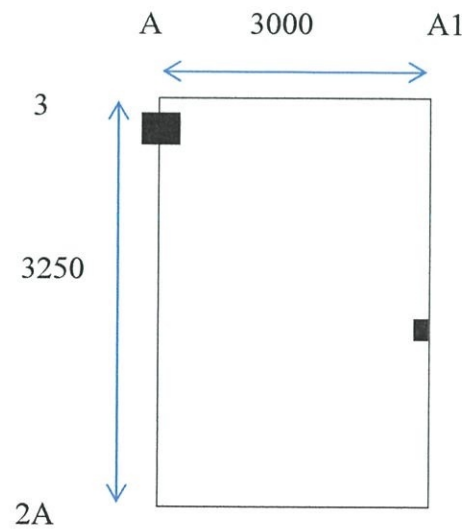
$$= 2.61492622 \text{ (If } > 2, \text{ it's called one way slab)}$$

II. Two way slab



Example from second floor slab layout plan :

Grade A – A1 / 2A – 3



Solution :

$$L_y / L_x$$

$$= 3250 / 3000$$

$$= 1.08333333 \text{ (If } < 2, \text{ it's called two way slab)}$$

Learning process with technician



