



اَبُو سَيِّدِي تِكْنُوْلُوجِي مَارَا
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(PERAK)

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It is recommended that this practical report provided

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entitled

CONSTRUCTION OF CONCRETE DOME STRUCTURE

accepted in partial fulfillment of the requirements for obtaining a Diploma in Building.

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STUDENT DECLARATION

I declare that this practical report is the result of my own research except as express through practical training that I went through for four month from 13 May 2013 to 28 September 2013 at ArashCipta Sdn. Bhd. It is also as one of the requirement to pass the course DBN307 and it submitted in partial fulfillment for obtaining Diploma in Building

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Thank you.

BUILDING DEPARTMENT
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(PERAK)

OCTOBER 2013

STUDENT DECLARATION

With this declaration, all of this Training Practical book report has been finish and produced completely by my-self, except as express through practical training that I went for five month start from 13 may 2013 until 28 September 2013 in company ArashCipta Sdn. Bhd. This report book and declaration also as one condition to pass DBN 307 and to obtaining a Diploma in Building.

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ABSTRACT

In summary, this Practical Training Book Report described all of the construction method and process that use in construction of concrete dome structure. This practical training book is refers and base on experience for five month in site project at Serdang, Bandar Baharu, Kedah Darul Aman. Actually, this practical training report is divided by few step and method, it starts from company background and background of construction project. Throughout observation, construction of concrete dome structure is not easy as well that we expect. Truly, construction of dome structure basically including many of parties and difficult method. So in summary , the method construction of concrete dome structure start from formwork, build circle formwork, formwork installation, steel reinforcement installation, how to lock formwork, concrete work, column construction and finishing with is brickwork, frame installation and plastering. All of this case study is based on observation, interview, book and internet. During construction of concrete dome structure, a few problems have come and this problem has been solving completely by suggestion that based on surrounding environment and creativity. As a conclusion, this practical training book report is benefit and can give us lot of information in more detail also can give knowledge to everyone.

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LIST OF ABBREVIATION

CIDB	Construction Industry Development Board
SUB-CON	Sub- Contractor
MAIN-CON	Main Contractor
Y	Yield
UITM	Universiti Teknologi MARA
MDC	Micro Dynamic Concrete

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Dome is one of the important symbols for building, especially for most mosques in Malaysia and in the world. Dome in a mosque is a structural element that placed above the main prayers hall. In Malaysia, without dome, mosque means nothing for the structure and design. This is because when public saw and see dome, they must know and can identify that it was mosque. Dome can be defined as circle structure with cover panel that use in building especially for mosque. In construction, many of dome concrete structure will be design with circle and have window. So, dome structure can be function as natural lighting and as aesthetic value.

In Malaysia, there are many sizes of dome steel structure and dome concrete structure. For example size of dome concrete structure is 3200mm diameter, 500mm diameter, 10 000 mm diameter and the others. For height, there also many types such as 2000mm, 2100mm, 2500mm and the others. Basically, size of dome concrete structure depends on architecture design and building its self. The concept just simple, more size more function and cost to construct. For dome structure design, there also have few types. We can see dome structure that square and circle. But, for dome steel structure there have many types such as nion and half nion. So, all of this size and types depend on architecture design, cost and function.

Method construction for dome structure can be dividing by two. First, they use precast concrete structure that made in factory and second they use in-situ concrete structure. For precast concrete structure the construction are simple, faster, and quality but its take high cost. For in-situ concrete structure the construction method is little bit difficult especially when the structure is circle and its take time also skilled labors.

In this training book report, it's more focus to construction method of concrete dome structure. This construction method of dome structure including formwork, steel work, brickwork, plastering and final step. Construction method of dome structure day by day will be more modern and variety. So, by doing this report, we can learn and get lot of information about construction method of dome structure start from first step until final step.

1.2 OBJECTIVE

The objective for this study is:

- i. To determine the construction method of mosque dome structure.
- ii. To identify the plant and machineries use for construction of mosque dome structure.

1.3 SCOPE OF STUDY

Scope of this study is to fulfill and determine the objective that had been stated. This scope of study including construction method of concrete dome structure start from first step until final step and the machineries use in construction of dome structure. Basically, this scope of study located at Serdang area, Bandar Baharu district, Kedah Darul Aman. Besides that, this scope of study also including how the workers work in high level in small area.

1.4 METHOD OF STUDY

Basically, there are two method of study:

i. PREMIER

Premier can be defining as main and foundation for anything. By using premier method for study, we can identify and determine how work this scope of study. So, there is few premier method of study:

a) Observation

Observation is one of the important method in order to study all of installation and construction method in more detail and focus. By observation, anything on site we can learn. We also can know how really the construction work on site. This is because what in construction not 100% same as we learn in book and class. For example, we observe construction method of sewerage pipe, but on site maybe different because of the situation and different environment. So, by observation method we can learn and differentiate how really construction work on site.

b) Interview

Others than observation method, by interview also we can study anything in construction. Interview method can be define as someone or public that we ask and get information by asking him by our self. By interview, we can easily get information and knowledge with more effective. Usually, there are many of people that involve in this interview including director manager, project manager, site supervisor, workers and also public people. When we interview someone and ask them what we want to know, they can easily teach us and give information especially about construction method. This interview method is effective because when we interview someone that has lot of experience, it will be advantage for us. Not only knowledge important but experience

also important and both of this must be balance. So, anything about construction that we want to know, we can interview them as a student.

ii. SECONDARY

a. Book

Others than observation and interview, book also is the one method of study. By reading and refer book, we can get lot of information especially about construction method. Nowadays, lot of book can be found at market. So, by reading construction book, we can learn and have a guide to study about construction.

b. Internet

Internet as latest media is also one of the most important methods to study. Internet can be use anywhere, anytime, and it's faster in order to search construction information. By using internet, we can search various topic and more detail.

c. Journal

Journal can be defined as writing material that can give lot of information for public. Basically, journals have lot of topic and information that benefit to us. By writing journal also, we can get knowledge and information about anything especially about construction activities. We also can know the modern technology that use in construction activity. So, by refers and writing journal, we can easily get knowledge.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 INTRODUCTION

ArachCipta sdn. Bhd was established in recession year where the economy unstable. But, with effort and confidence, this company can survive until now and become more popular and bigger with stable financial.

Founder of this company is En.Mohammad Fauzee b. Mohamad as director manager. He graduated from polytechnic Sultan Abdul Halim Mu'Azam Shah in civil engineering diploma. Before start this company, he worked with AIMA Development sdn. Bhd. start from 1July 1991 until 30 September 2000. During this period, En. Mohammad Fauzee gets experience and learns lot about construction.

Because of his knowledge, experience and interest about construction, he starts this company as sub-contractor. ArachCipta Enterprise was the name when he starts this company as sub-contractor. One of the projects is drainage, sewage pipe, sewage plant, septic tank and the others.

With stable financial and staff, En Mohammad Fauzee change the company identity from ArachCipta Enterprise to ArachCipta Sdn. Bhd. ArachCipta Sdn. Bhd was registered with Contractor Service Center (PKK) in class C indigenous. This company also registered with Construction Industry Development Board (CIDB) grade 4, Finance Ministry, National Water Service Commission (SPAN) class C3 and D, Telekom Malaysia Berhad (TNB), Propel, PLUS, FELCRA and the others private company.

From now, ArachCipta Sdn. Bhd has handled many of private and government project. This company also have their professional staff and own heavy machineries. With their

quality performance and good reputation this company finally can fight in construction war.

2.2 COMPANY PROFILE

Objective

- i. A company that involve in construction by giving advantage and benefiting to Malaysia
- ii. Company that can be category as successful and sky symbol
- iii. Construction be more modern in orders to provide high quality.

Mission

- i. Ensure quality work in all of scope work.
- ii. Services are first, customers is everything.

Vision

Fly to be one of the most construction companies in Malaysia.

2.3 Organization chat of ArashCipta Sdn. Bhd.

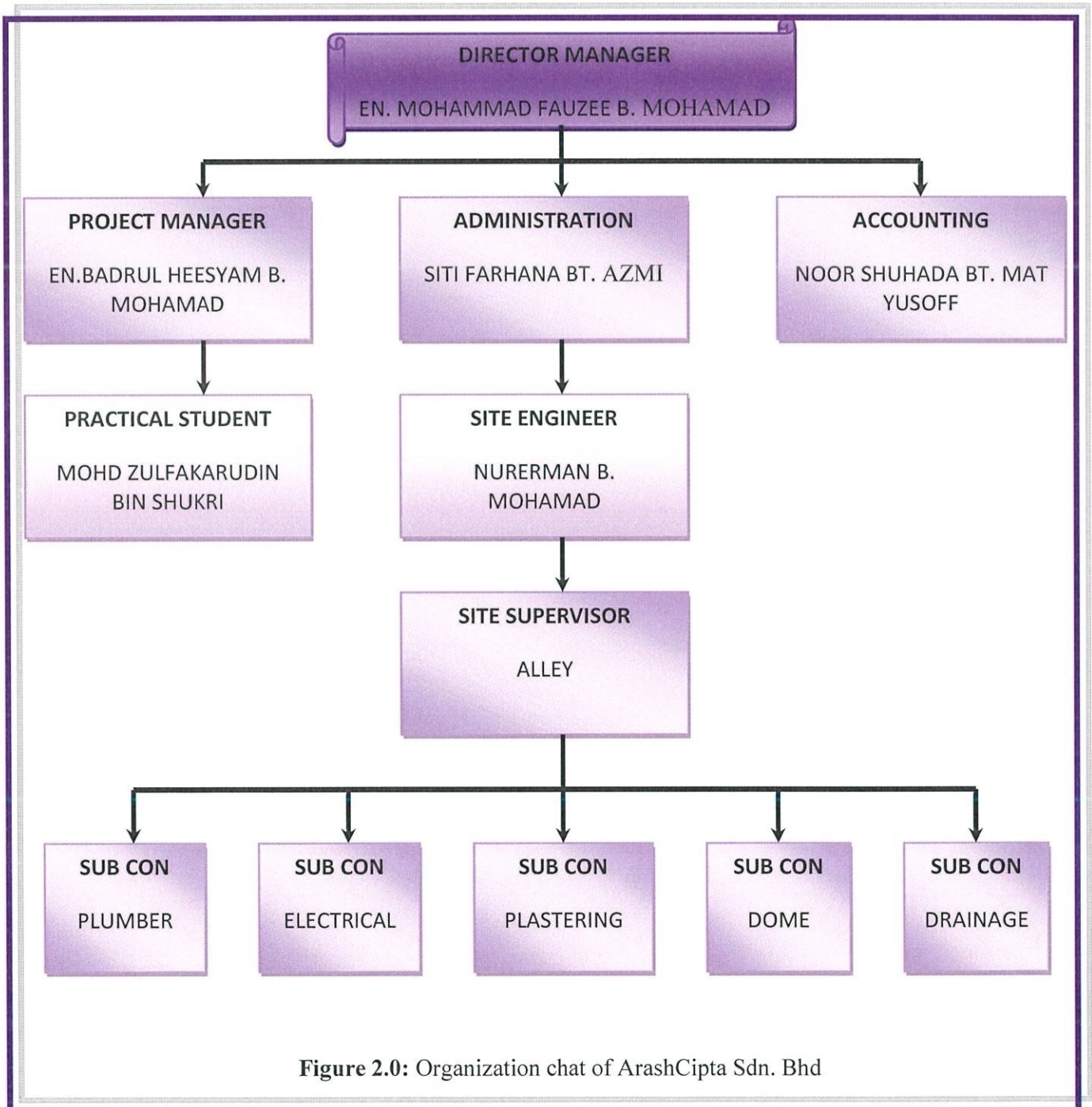


Figure 2.0: Organization chat of ArashCipta Sdn. Bhd

2.4 list of project

Table 2.4.1 List of project that has been done

NO	PROJECT	CLIENT	CONTRACT PRICE (RM)
1	PURPOSE OF 2 STOREY SHOP LOT AT PEKAN BANDAR BARU.	DISTRICT COUNCIL OF BANDAR BAHARU	693,677.00
2	DESIGN AND PURPOSE OF LOW-COST FLAT HOUSES AT LOT 808,809 & 810 MERGONG, AREA KOTA STAR, KEDAH.	STATE HOUSING DEPARTMENT	290,000.00
3	PURPOSE OF 4 UNIT(IKS) INDUSTRIAL WORKSHOP AT BANDAR BARU BERIS JAYA, SIK, KEDAH	OCCUPATIONAL OF WATER DRAINAGE	746,842.60
4	RENOVATION OF FACTORY TO LAUNDRY PLANT AT LOT PT-5348. KUALA KETIL, BALING KEDAH.	FABER MEDISERVE SDN. BHD	2,930,000.00
5	PURPOSE OF 94 UNIT HOUSE AT MUKIM NAGA, KUBANG PASU, KEDAH	AIMA DEVELOPMENT SDN. BHD	869,400.00
6	PROPOSED OFFICE RENOVATION WORK FOR BLOCK A,B AND C AT PENANG BRIDGE	PROPEL	297,883.00
7	PURPOSE OF RESIDENTIAL HOUSES AT MUKIM ANAK BUKIT, KOTA STAR, KEDAH	AIMA DEVELOPMENT SDN. BHD	1,051,000.00
8	PURPOSE OF 126 UNIT PERMANENT HOUSE FOR TSUNAMI VICTIMS, KUALA MUDA, KEDAH	NEG. BHD. HOUSES COMPANY	176,400.00
9	REPAIRING WORK FOR SEWAGE PIPE AT TAMAN NILAM, KEDAH.	LADA	180,613.00
10	PURPOSE OF 98 UNIT HOUSE	AIMA	360,000.00

	AT LOT 388, ANAK BUKIT, KOTA STAR, KEDAH	DEVELOPMENT SDN. BHD	
11	PURPOSE OF PLACEMENT HOUSE FOR FIRE VICTIM BUKIT MALUT AT KISAP, LANGKAWI, KEDAH.	SERI TEMIN DEV. CORP. SDN. BHD	460,000.00
12	PURPOSE OF MADA OFFICE AT ALOR SERDANG LOT 301, KOTA STAR, KEDAH	MADA	1,528,130.00
13	CONSTRUCTION OF RESIDENTIAL HOUSE AT JITRA, KUBANG PASU, KEDAH DARUL AMAN	AIMA DEV SDN. BHD.	1,070,000.00
14	PURPOSE OF STORY DEPOT FOR FACILITY OF ZON UTARA VICTIM, KEDAH	KEDAH STATE GOVERNMENT	1,699,785.00
15	PURPOSE OF 67 UNIT HOUSES AT TAMAN SIMPANG 2, KOTA STAR, KEDAH	AIMA DEVELOPMENT SDN. BHD	707,000.00
16	PURPOSE AND CONSTRUCTION OF MADA OFFICE, AT ALOR SERDANG, LOT 301, MUKIM SALA KEDIL, KOTA STAR, KEDAH DARUL AMAN	MADA	1,5281,130.00
17	CONSTRUCTION OF SIMPANG KUALA SECONDARY SCHOOL AT KOTA STAR, KEDAH DARUL AMAN	EDUCATION MINISTRY	1,630,000.00
18	CONSTRUCTION OF ONE BUILDING 1 STOREY AT LOT 1842, SUNGAI PETANI, KEDAH DARUL AMAN		2,479,184,20
19	CONSTRUCTION OF 2 UNIT SHOP LOT 3.5 STOREY, AND 15 UNIT 3 STOREY SHOP LOT AT PT6830-PT6846, KUBANG PASU, KEDAH DARUL AMAN	AIMA DEV. SDN. BHD.	915,000.00
20	PROPOSED CONSTRUCTION OF NEW PUBLIC SURAU AT KUALA KANGSAR TOL PLAZA	PLUS	963,333.00
21	CONSTRUCTION OF PERSISIR PANTAI ROAD FROM KUALA SANGLANG TO KUALA KEDAH,	JKR OF KEDAH	579,873.26

	KEDAH DARUL AMAN		
22	PANEL CONTRACTOR (NORTHERN REGION)	PROPEL	MAINTANANCE WORK
23	PROJECT RENOVATION OF SPORT KOMPLEX AT LOT 3793, ALOR STAR, KEDAH DARUL AMAN	MINISTRY OF SPORT, KEDAH DARUL AMAN	4,464,102.50
24	PORPOSED UPGRADING OF SURAU AT GUNUNG SEMANGGOL RSA NORTH BOUND	PLUS	458,000.00
25	RENOVATION FOR FACILITIES AYER HANGAT AT LOT 1335,1337,1338,1339,225 AND LOT 1341,220,228 & 227	LADA	1,924,779.92
26	CONSTRUCTION OF ADDITIONAL BUILDING FOR KOMPLEX INDUSTRI, LOT 14141,GURUN, KUALA MUDA, KEDAH DARUL AMAN	MALAYSIAN NPK FERTILIZER SDN BHD	3,751,111.11
27	CONSTRUCTION OF ONE UNIT BANGLO 2.5 STOREY AT LOT 127 SEKSYEN 36, ALOR SETAR, KEDAH DARUL AMAN	FATIMAH KARIM ARCHITECT	750,000.00
28	CONTINUE AND UPGRADE CONSTRUCTION OF ROAD TANJUNG BENDAHARA, ALOR SETAR, KEDAH DARUL AMAN	AL UMRAN CORPORATION SDN BHD	614,031.55

2.4.2 Project under construction

NO	PROJECT	CLIENT	WORK PERCENTAGE
1	<p>PORPOSE OF DEVELOPMENT SKIM:</p> <p>a) 5 UNIT HOUSES TWO STOREY (PT 3075, PT 3082, PT 3083, PT 3085, PT 3080, PT 3081, PT 3088)</p> <p>b) 7 UNIT HOUSES ONE AND HALF STOREY (PT 3076, PT 3077, PT 3078, PT 3079, PT 3080, PT 3081, AND PT 3088)</p> <p>c) 8 UNIT HOUSES ONE STOREY (PT 3071, PT 3072, PT 3073, PT 0174, PT 3084, PT 3086, PT 3087, PT 3088)</p> <p>AT JITRA, KUBANG PASU, KEDAH DARUL AMAN.</p>	AIMA DEVELOPMENT SDN. BHD.	50%
2	PORPOSE OF NEW MOSQUE AT BANDAR BAHARU, KEDAH DARUL AMAN	ICU OF KEDAH DARUL AMAN	30%
3	PORPOSE OF CLINIC AT NILAI, NEGERI SEMBILAN STATE.	JKR	95%

CHAPTER 3.0

CONSTRUCTION METHOD OF MOSQUE DOME STRUCTURE

3.1 Introduction



Photo 3.1 Construction of new mosque

Construction of Bandar Baharu mosque is one of the biggest buildings in Bandar Baharu Serdang area. This new mosque located at Bandar Baharu district, Serdang, Kedah Darul Aman. When construction of this mosque finish, the old mosque will be replace and be library for public people. Basically, this mosque construct at high level where there are a lake around this mosque. So, landscape of this new mosque will be more beautiful. Mostly, this mosque use in-situ construction for structure, just for roman pillar column use precast concrete.

In this new mosque, it comes with few facilities such as reading room, VIP room, meeting room, store, utility room, OKU room, imam room and the others. So, public can get good facilities when they come to this new mosque.

What special about this new mosque is dome. Most of mosque will use dome as symbol for mosque. Construction of structure dome for this mosque is one of the most difficult constructions. This dome structure is circle and large size, so the construction method must be monitoring and take time. Start from first step until final step, this concrete dome structure refers to architecture drawing and engineering drawing. This new mosque has three dome, but it more focus on main dome structure. So, construction method of concrete dome structure is important in order to finish last step.

3.2 Project Background

The project of this case study is construction of new mosque at Serdang, Bandar Baharu, and Kedah Darul Aman. Main contractor of this project is ArashCipta Sdn. Bhd. that placed at TKBA/1, Titi Besi Road, Old Town, 06200 Kepala Batas, Kedah Darul Aman. Contract no of this project is PPPNK/08/2012. For information, client of this project is State Council of Islam, Kedah that placed at Wan Mat Saman building, 05000 Alor Setar, Kedah Darul Aman.

The contract cost of this project is RM 4, 471, 111.11. Date during site entering is 5 September 2012 and expected to end on 26 November 2013. So overall 16 month need to finish this project. ArachCipta Sdn. Bhd. as main contractor use license class “C” and this project is under Ministry Department of Kedah (ICU). Progress of work in May-Jun 2013 is 10.00% in schedule, actually 15.00% in construction- add negative and positive (% , day) is 5.00%, 19.20 days. Financial progress is 34.8% in schedule and actually 13.7%, fast -21%. A few policy insurance that involve in this construction is Workmen Compensation- 011200043164, Contractor All Risk- 01120043163 and PERKESO-D6113213x.

There are few sub-contractor of this project. Tritech Electrical is sub-con for electric, consultant M&E is K&H Consultant, civil consultant is Ku Associated (M) Sdn. Bhd, surveyor is Sr. Survey Consultant. For staff, Project Manager is En. Awie, engineer is En. Nurerman b. Mohamad and Site Supervisor is En. Alley.

Table 3.1 Work progress in construction of new mosque

SPECIFICATION	NO	WORK DETAIL
WORK THAT HAS BEEN DONE	1	BOX CULVERT 1200MM MAIN ROAD
	2	SUMP BOX CULVERT 1500MM X 1500MM MAIN ROAD
	3	PLANTING GRASS
	4	PILING AT TOILET AND FACILITIES AREA
	5	PAD FOOTING, STUMP & MOSQUE COLUMN
	6	GROUND BEAM AND MOSQUE SLAB
	7	GROUND BEAM AND SLAB AT TOILET AND FACILITIES ROOM AREA
	8	COLUMN AND BEAM TOILET AND FACILITIES ROOM AREA
	9	FORMWORK, STEEL WORK AND CONCRETE MOSQUE COLUMN
	10	INSTALLATION OF RAIN WATER PIPE GUTTER
	11	FORMWORK FOR ROOF AT FIRST LEVEL
	12	FORMWORK GUTTER AND BEAM
	13	SLAB AND FLOOR AT TOILET AND FACILITIES BLOCK AREA
WORK UNDER CONSTRUCTION	1	PLANTING GRASS AT SLOPE
	2	SLOPE CONSTRUCTION
	3	RING BEAM
	4	GUTTER BEAM & BEAM FOR TOILET
	5	BRICKWORK
	6	INSTALLATION OF GRC ARCH
WORK THAT WILL BE CARRIED	7	STRUCTURE DOME AT ANJUNG
	1	RC GUTTER AT SECOND FLOOR & ANJUNG
	2	CONSTRUCTION COLUMN AT TOILET AND FACILITIES BLOCK AREA
	3	ROOF TRUSSES
	4	BRICKWORK
5	BUILD STEEL DOME STRUCTURE	

Table 3.1 Progress Work in Construction of New Mosque

3.3 Installation Method of Concrete Dome Structure



Photo 3.2
Formwork



Photo 3.3
Circle Formwork



Photo 3.4
Formwork
Installation



Photo 3.7
Concrete



Photo 3.6
Lock Formwork



Photo 3.5
Steel
Installation

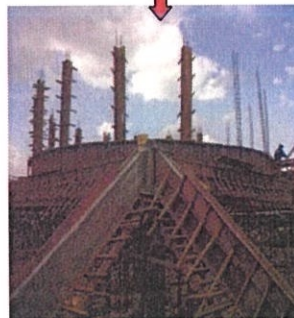


Photo 3.8
column
Construction

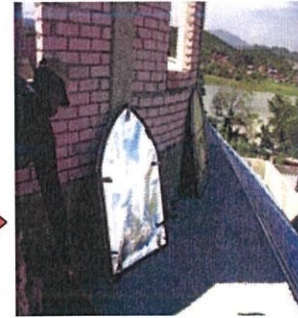


Photo 3.9
Brickwork, Frame
and Plastering

FIGURE 3.0 Construction Method of Concrete Dome Structure

3.2 Formwork that use for concrete dome structure

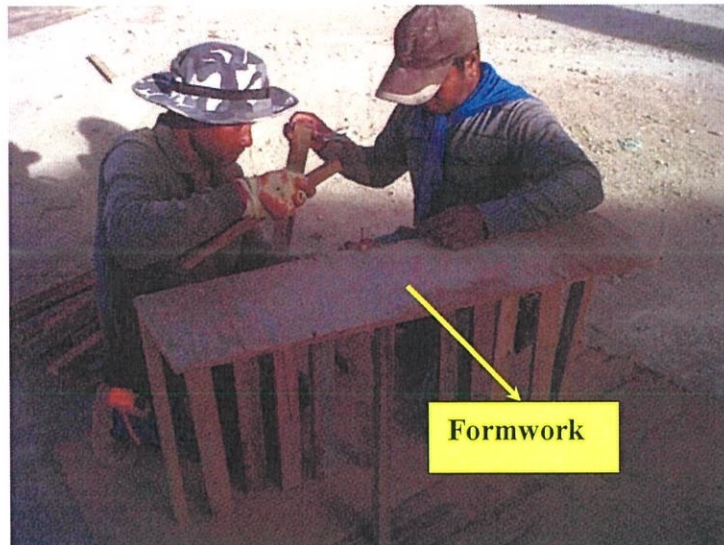


Photo 3.10 Build Formwork for Dome Ring Beam

The first step before start construction of concrete dome structure is built and design formwork. This timber formwork made by *kasau* wood size 2inci x 1inci and plywood. The worker will cut and build formwork at bottom by using nail as joiner between *kasau* wood and plywood. This first step is important because formwork must be strong enough to carry and load and pressure, especially concrete load.

All of this formwork must be build at bottom to ensure safety of workers and to make sure workers work in good condition. For information, this formwork must be support by *kasau* wood in spacing 100mm center to center. In this first step, the formwork must be build and cut with circle design. So, the structure can follow this circle shape.

3.3 Design and build circle formwork

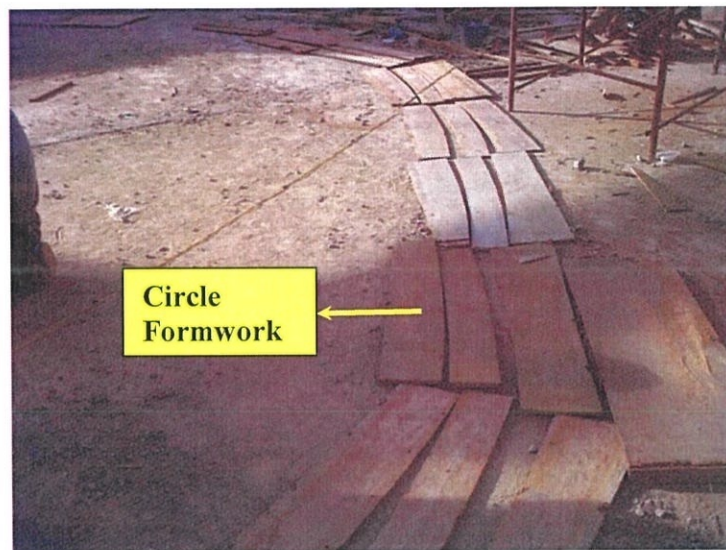


Photo 3.11 Design Circle Formwork and Circle Line for Dome Ring Beam

After cut and build dome formwork, the circle line must be design and line up. This circle line will be design by refer architecture drawing and engineering drawing. By refers this drawing, the size have been provided with is including the diameter, perimeter and the radius. So, workers just follow this size.

To get center point and center line, the workers will measure the concrete dome structure diameter. The diameter is 40 feet and 29inci. This size will be dividing into two and they mark the center point. From center point, they open circle area and draw the circle line on the floor by using marker pen and nail.

Then, they continue build formwork by following this circle line. This is because this circle line can give accurate size and area. To ensure the formwork is fix and accurate to circle line, the workers mark formwork in numbering. So after this they just install this formwork by following the numbering.

3.4 Installation of dome formwork



Photo 3.12 Installation of Internal Dome Formwork

This is the step where all of the formwork will be install at main dome area, at the top. All of formwork will be transfer and move at the top by using rubber pipe with tires. At the top, the workers just install this formwork by following the numbering that has been mark to make sure the installation easy and save time. For information, there are two part of formwork with is internal and external formwork. But, in this step the workers only install internal formwork. The reasons why they install internal formwork first because to ensure steel reinforcement can be easily installed after this.

During install this formwork, they also must apply supporting wood to support formwork. The workers use “kasau” wood size 2inci x 1inci and this supporting stand around circle formwork. Installation of this formwork is using nail as joining between supporting wood and formwok. This work must be carried in right condition because the worker works in high level and in small space. Safety of the workers is important in this situation.

3.5 Installation of steel reinforcement at ring beam



Photo 3.13 Installation of Steel Reinforcement at Ring Beam

After installation of internal formwork done, the workers will install steel reinforcement. Basically, this concrete dome structure use steel reinforcement size Y20 and link that use is R8. Steel work is made by skilled workers by refers engineering drawing and steel drawing. Bar bender machine and bar cutter machine is also use in this step. By refers engineering and steel drawing, size already shown that including the types of steel, length of steel, lapping, spacing, bend, pieces and the others. This steel work is very important because steel reinforcement will carry load, especially dome load. So, any mistakes can be dangerous to public after finish.

To install steel reinforcement, workers will pull up the steel reinforcement by using crane and rubber pipe with tires. To get circle shape for steel reinforcement, the workers use bar bender until circle shape is aquarete. In this situation, there no reason why the workers cannot get circle shape for steel reinforcement work.

3.6 Lock formwork at dome ring beam

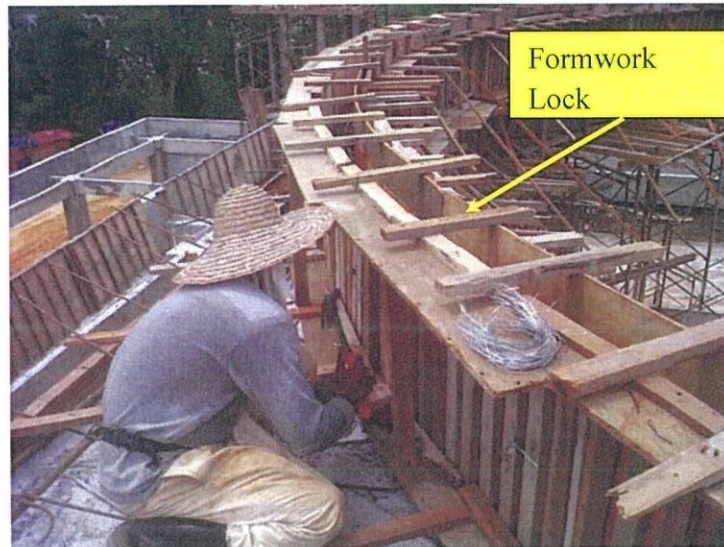


Photo 3.14 Locks the formwork

In this step, external and internal formwork can be lock and fix together. This is because steel work has been finish install on ring beam. So, this formwork can be lock before concrete work start. To lock this formwork, the labor use “kasau” wood. The method to lock formwork is every 1 feet, they must lock the formwork to ensure its strong enough during concrete work.

For information, not only the top must be lock but around the formwork such as right and left. Put “kasau” wood to support formwork and attach to slab by using concrete nail size 2½inci. This work very important to ensure the ring beam of dome not bend or broken during concrete work.

3.7 Concrete work by using crane bucket at ring beam



Photo 3.15 Concrete Works Grade 30 for Ring Beam

Before concrete work, the worker installs steel reinforcement for column first. This column steel reinforcement joins to dome ring beam and have 16 columns. They use steel reinforcement size Y16 with lapping 700mm.

Then, concrete work can be carried. By using crane bucket, concrete work has been done. This dome ring beam use concrete made by “MDC” and use grade 30 GI. To ensure and avoid honeycomb, the workers use vibrator machine along with concrete work.

For information, concrete work must be carried fast and not more than three hours. This is because when the concrete expose to environment more than three hours, the concrete will less strength and the ability to mix together is less.

3.8 Column construction

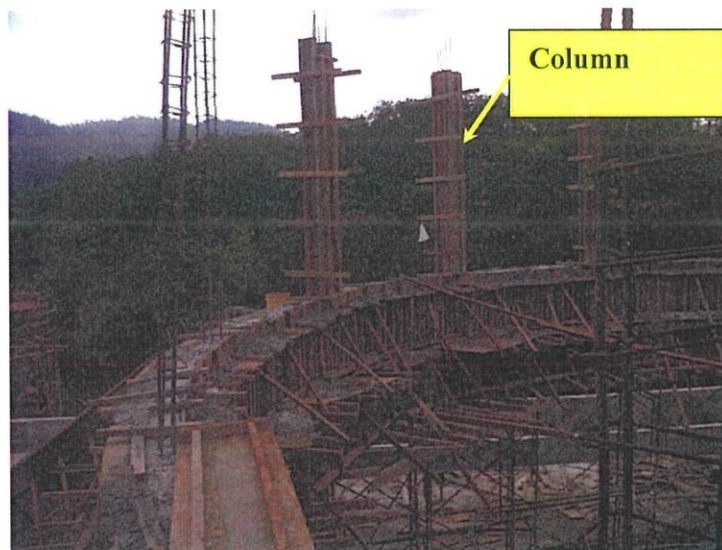


Photo 3.16 Installation of Column at Ring Beam

After all concrete work for ring beam done, the worker will build and install steel reinforcement also formwork. For column the size is 150mm x 250mm and they use steel reinforcement size Y16-R8 with spacing 300mm center to center.

The lapping for steel reinforcement is 700mm. This column must be installing by following the ring beam circle. So, it must be center to each others. Then, apply formwork and lock carefully. Then, concrete work can be start as well. This column also use concrete grade 30 GI.

3.9 Installation of brickwork, frame and plastering work

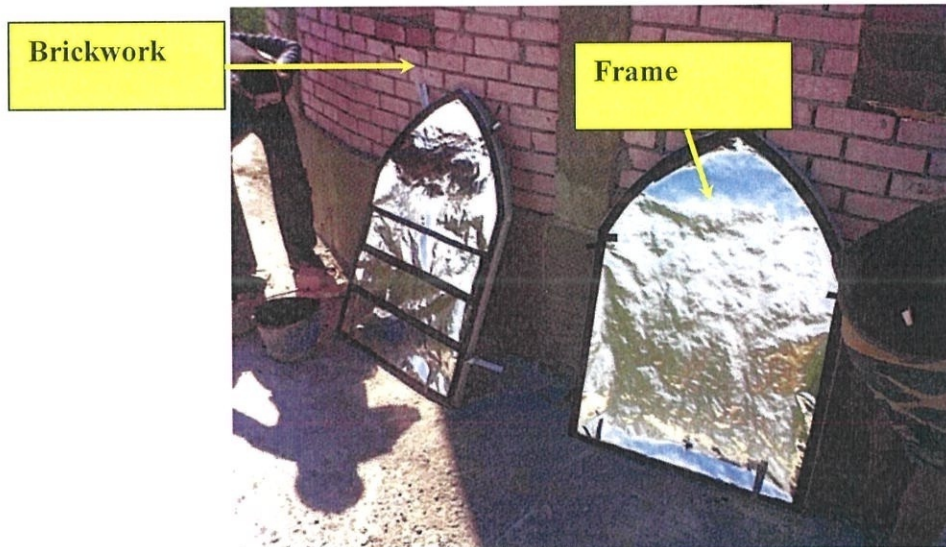


Photo 3.17 Brickwork and frame installation

Brickwork starts first before they can install frame. This dome structure use strecher bond. For frame installation, the workers will level the height and opening to get center. This frame along with glass and the size is 1200mm x 800 mm. High of frame is important because the window function as natural lighting for main prayers hall.

During plastering work, all of column will be hiding by plaster to ensure this dome structure good well. This dome structure surface has been plaster with hard surface. Its mean during plastering the workers not use lime oil, the workers just use sponge as hard surface.

Problem and solution during construction of concrete dome structure

During construction of concrete dome structure, there are few problems that workers face. First problem that workers face during construction is machine. Machine such as Bar Bender and Bar Cutter at some time will be broken and out of services. In this situation, workers must manually work without machine or stop the construction until the machine is repair. As we know, Bar Bender and Bar Cutter is use for steel reinforcement work. So construction of concrete dome structure will be slow and take time. This problem is come up with solution by check and services the machine one time for a week to ensure all of part in machine such as lubrication oil, diesel oil, machine in good condition.

Others than that, weather condition also is one of the problem that must be face by workers. During construction, when the day has hard rain, construction must be stop on time. This is because the workers work in high level, so rain water can cause workers split then fall down. In this case, safety of workers is more important than construction work. One more problem during heavy rain is lightning. Heavy rain with lightning is very dangerous for workers especially the workers in high level with steel reinforcement around them. The solution in this problem is organizing the work more properly and more detail, so when have raining day, workers still can work at bottom. For example build formwork, or steel reinforcement work at bottom.

Lastly, the problem that must be face is different size and work between architecture drawing, engineering drawing and on site work. On site, the size cannot be 100% same with drawing, because it little difficult especially when the structure is sphere. So, the solution, just adjust the work by refer surrounding environment and this must be inform to architect.

3.4 Machineries and plant that use in construction of concrete dome structure

Bar bender machine

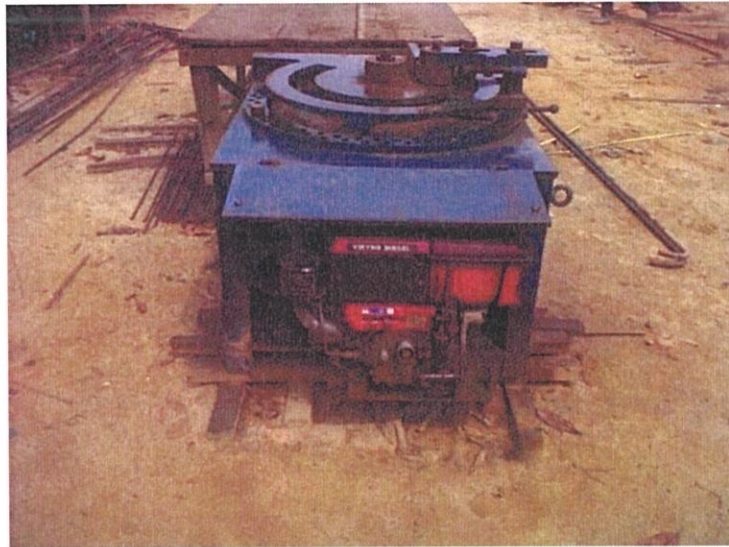


Photo 3.4.1 Bar bender machine that use to bend steel reinforcement

One of the machines that use for construction of concrete dome structure is bar bender machine. This bar bender machine is use for steel reinforcement work. During installation of steel reinforcement, workers will use this bar bender machine to bend the steel reinforcement. By refer engineering drawing, workers will bend the steel reinforcement as same as shown in drawing. So, workers not face difficult to bend steel reinforcement because when the workers bend steel reinforcement manually, it take time.

Bar bender machine have angle adjustment. To bend steel reinforcement workers can adjust the angle by refers engineering drawing. For example, the steel reinforcement can bend 40°, 45°, 60°, 120°, U-shape and the others. So, bend of steel reinforcement will be more aquarate.

Method to use this machine is simple. First, step to use this machine is starting the engine. This machine use diesel oil. After start the engine, put steel reinforcement that want to be bend. Then, adjust bend angle as we want by refers drawing. Lastly, jack the paddle at the bottom of machine to bend steel reinforcement. This machine is important in construction especially for steel reinforcement work.

Bar cutter machine



Photo 3.4.2 Bar cutter machine that use in construction of concrete dome structure

Bar cutter machine also use in construction of concrete dome structure. Bar cutter function is to cut steel reinforcement. By using this bar cutter machine, workers can cut steel reinforcement in length that they want to install. This machine also can cut steel reinforcement in large quantity at the same time. This machine can cut up to seven nos of steel reinforcement in one time. But for large size like Y25, quantity will less because diameter of steel reinforcement will affect the space of opening cutter machine.

To use this machine, first the workers must start machine engine. After start the engine, put pieces of steel reinforcement that want to cut. After put steel reinforcement and measured the length, just jack the paddle at bottom of machine and the machine will function. Bar cutter machine is important in order to carry out steel work in construction.

Vibrator machine



Photo 3.4.3 Vibrator machine that use during concrete work

During concrete work, vibrator machine is use. Function of vibrator machine is to avoid honeycome during concrete work. During concrete work, the concrete maybe contain bubble air that can cause honeycome. So, by using vibrator machine, honeycome can be avoided. Honeycome is the situation where the concrete contain air, so we can see aggregate and steel reinforcement after formwork be removed. That why, workers will use vibrator machine along with concrete work to avoid honeycome that can cause concrete structure less strength.

Second function of vibrator machine is to balance concrete quantity. When workers use vibrator machine during concrete work, fresh concrete will spread all off area and be balance. So, vibrator machine is one of the important machines during concrete work.

Crane



Photo 3.4.4 Crane that use during concrete work

Crane is heavy machineries that use during concrete work for all concrete structure especially for concrete dome structure. For information, crane has varies size and types such as 20 tone, 30 tone, 100 tone, 120 tone and can be up to thousand tone. During concrete work for dome structure, crane is use by using it bucket to pull up concrete for bottom to dome level. Basically, crane has it base, so possibility to lose balance is minimum during concrete work.

Crane also is use to pull up materials. Crane is use to pull up material such as brick, sand, roof tiles and the others. For concrete dome structure, crane is use to pull up steel reinforcement, brick, and sand. First the workers will cut steel reinforcement at bottom and then be pull up by crane at same day of concrete day to reduce rent cost.

CHAPTER 4

CONCLUSION AND RECOMMENDATION

4.1 Conclusion

As a conclusion, this case study and report give us lot of benefit and information about construction. First, we can learn and determine the construction method of mosque dome structure. Start from first step until finishing, it start from formwork, circle formwork, the installation of formwork, installation of steel reinforcement, how to lock formwork, concrete work, construction of column, and finally brickwork also plastering. All of this method is important in order to construct concrete dome structure. Others than that, we also had learn that construction of concrete dome structure is not easy and not all same in book, it will difference because of the surrounding area and creativity. Others than construction method, we also know the machineries and plant that use in construction of dome structure. The machineries and plant that use including bar bender, bar cutter, vibrator, and crane. Without this machineries and plant, the construction method will be difficult and take time. Finally, this case study is important and benefit to us because we can learn and know how really construction activity work on site.

4.2 Recommendation

Basically, concrete dome structures have various types and design. In this case study, we had learned and know construction method of concrete dome structure. In suggestion for future, the case study is about square concrete dome structure. Most of concrete dome structure is circle, but square dome structures have different method to construct. This topic can provide more knowledge and information in future. Hope, in future the case study is including square dome structure with its steel dome structure, so we can get more knowledge in future.

4.3 REFERENCES

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En. Mohammad Fauzee B. Mohamad as Director Manager of ArachCipta Sdn.Bhd.

En Awie bin Abdullah as Project Manager

En.Nurerman B.Mohamad

En.Badrul Heesyam B.Mohamad as Project Manager of ArashCipta Sdn. Bhd.

ATTACHMENT A

- REVISI
1. NO. 001
 2. NO. 002
 3. NO. 003
 4. NO. 004
 5. NO. 005
 6. NO. 006
 7. NO. 007
 8. NO. 008
 9. NO. 009
 10. NO. 010



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JABATAN PERDANA MENTERI
SEKOLAH TEKNIK

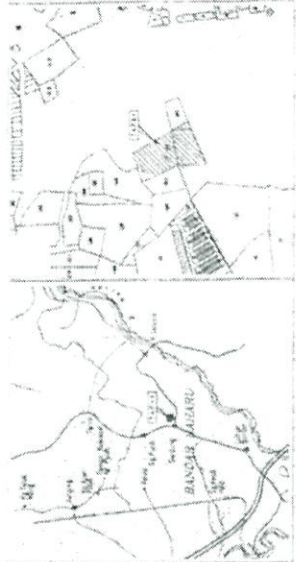
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PELAKSANA: PT. BINA BANGUN

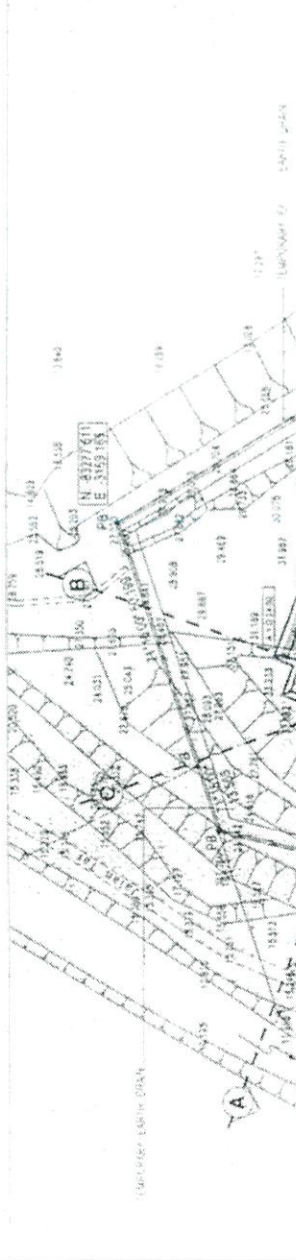
PELAKSANA: PT. BINA BANGUN

CADANGAN KERJA KERJA MERIBINA
SEBUAH MASJID BANDAR BARU
KEDAH DARUL AVAN

NO. PROJEK	11/2018
NO. RENCANA	11/2018
NO. SURVEI	11/2018
NO. DESAIN	11/2018
NO. KONSTRUKSI	11/2018



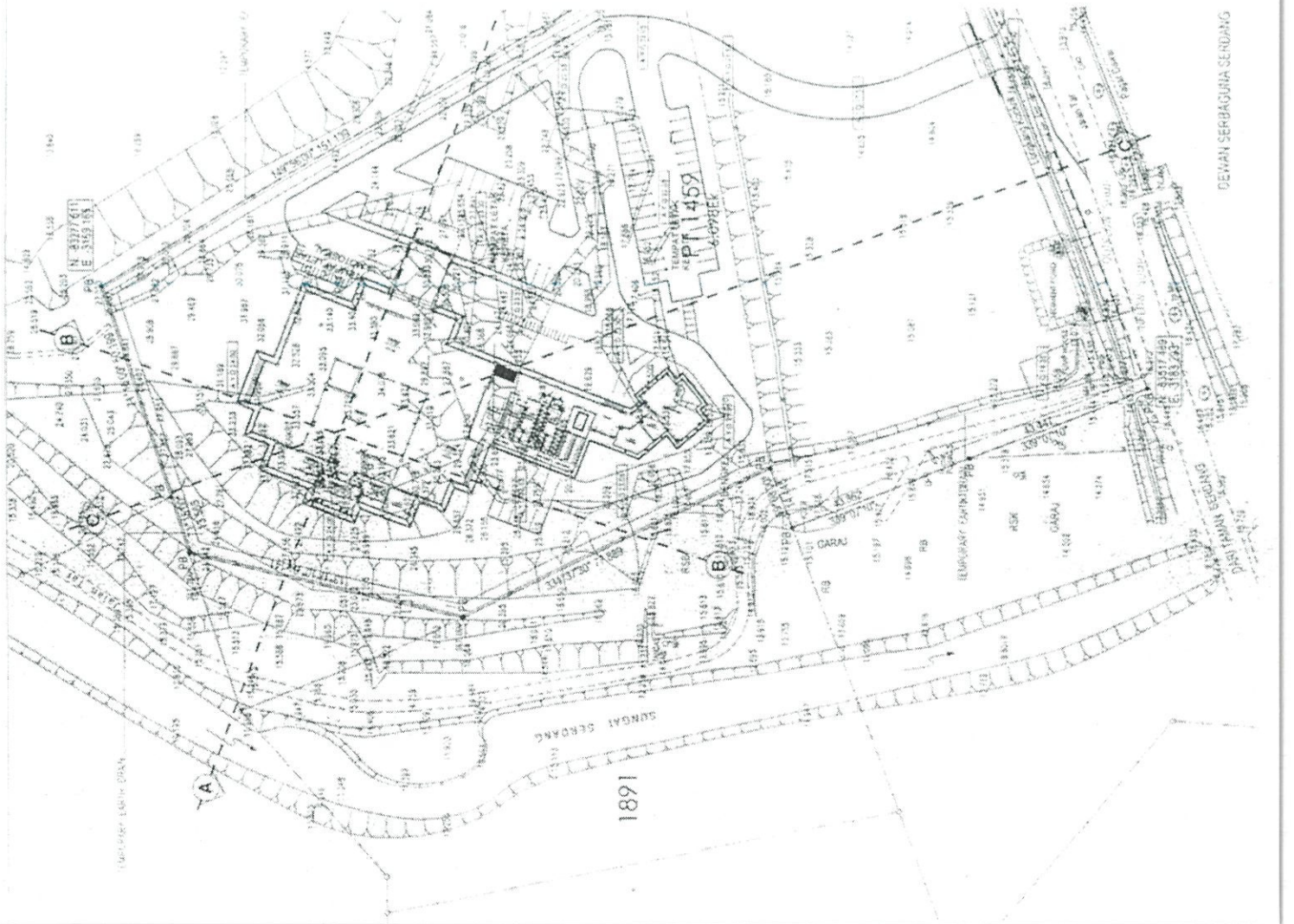
LOCATION PLAN



KEY PLAN

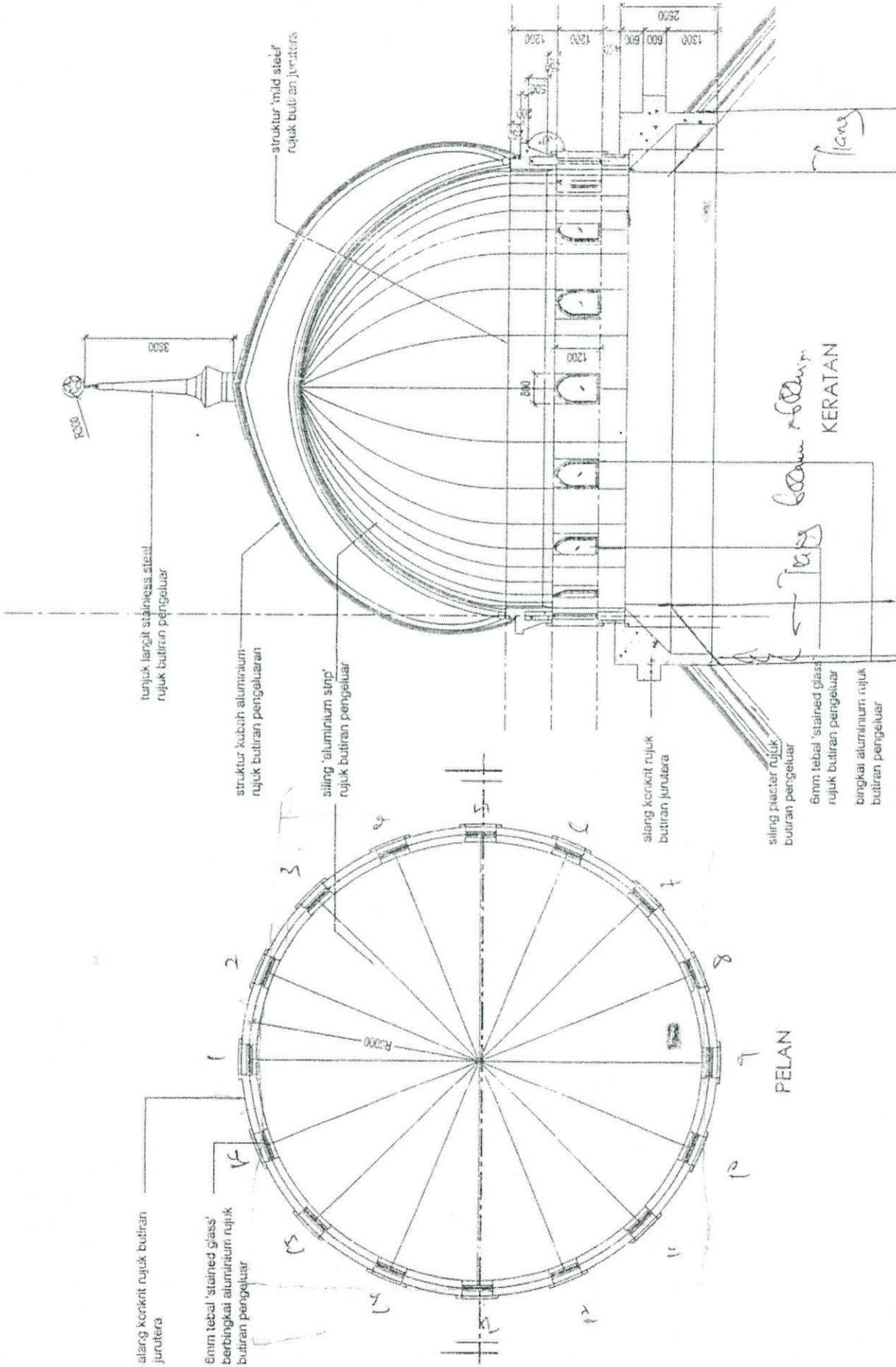


SITE PLAN



DEWAN SERBAGUNA SENDANG

1891



alang konkrit rujuk junutera

6mm tebal 'stained glass' berbingkai aluminium rujuk butiran pengeluar

tunjuk langit stainless steel rujuk butiran pengeluar

struktur kubah aluminium rujuk butiran pengeluar

siling 'aluminium strip' rujuk butiran pengeluar

struktur 'mid steel' rujuk butiran junutera

alang konkrit rujuk butiran junutera

siling plaster rujuk butiran pengeluar

6mm tebal 'stained glass' rujuk butiran pengeluar
bingkai aluminium rujuk butiran pengeluar

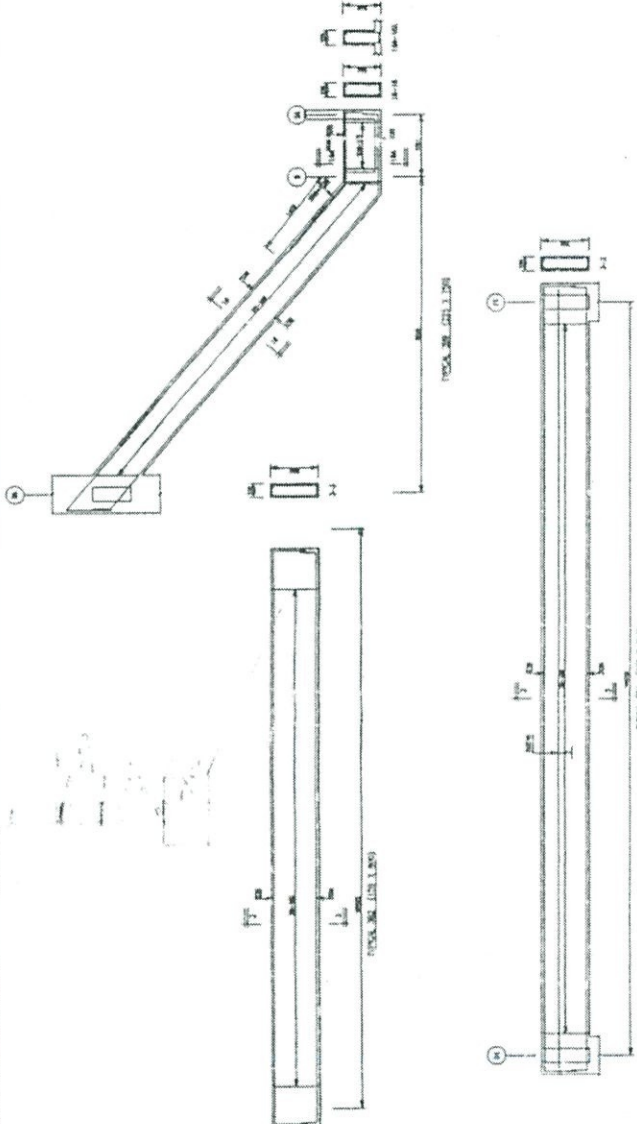
6mm tebal
KERATAN

PELAN

<p>JABATAN PERENCANA MENTERI SEKSYEN TEKNIKAL</p>	<p>PEJABAT KEWAJIBAN NEGARA DAPAT KAWALAN KEPADA TUMBUHAN PERUMPAH KEWAJIBAN NEGARA (PERUMPA)</p>	<p>NO. LUKISAN P/PN (K) / B / I / B / I / B / B / 2 / 1 / 12 (08/18)</p>
	<p>PROJEK CADANGAN KERJA-KERJA MEMBINA SEBUAH MASJID BANDAR BAHARU, KEDAH D A</p>	<p>TAJUK LUKISAN PERINCIAN KUBAH - PELAN & KERATAN</p>
<p>PELAKSANA M. WAN SUKHMAD N. S. B. WAN SUKHMAD</p>	<p>DESEKAM TARIKH Feb. 2010</p>	<p>SKALA 1:100</p>

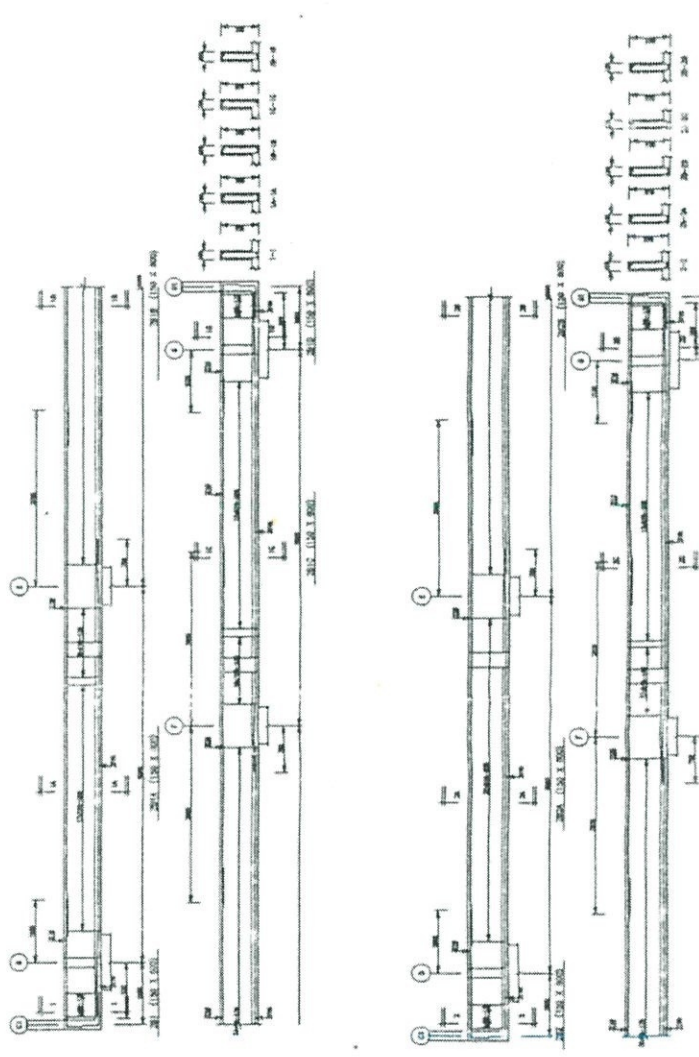
ATTACHMENT B

RTH - 	FAKULTAS TEKNIK HALUIS AGAMA ISLAM NEGERI KEPARISRAJEN 	INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA	PROGRAM STUDI TEKNIK SIPIL JURUSAN TEKNIK SIPIL DAN PERENCANAAN FAKULTAS TEKNIK SIPIL DAN PERENCANAAN INSTITUT TEKNOLOGI SEPULUH NOPEMBER SURABAYA	NAMA : ... NIM : ... NPM : ... NPM : ...	NAMA : ... NIM : ... NPM : ... NPM : ...	NAMA : ... NIM : ... NPM : ... NPM : ...	NAMA : ... NIM : ... NPM : ... NPM : ...	NAMA : ... NIM : ... NPM : ... NPM : ...	NAMA : ... NIM : ... NPM : ... NPM : ...
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3RD FLOOR BEAM KEY PLAN
(SCALE = 1 : 100)

S1 = T10-200 (BOTTOM)
 T10-200 (TOP)
 THK : 125mm



2ND FLOOR BEAM KEY PLAN
(SCALE = 1 : 150)