



DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

PRE-CAST WALL PANEL AND STEEL FRAME CONSTRUCT
BY USING INDUSTRIALISED BUILDING SYSTEM (IBS)

Prepared by:

MUHAMMAD ABDUL JAZMI BIN ABDUL HARRITH

2016458742

DEPARTMENT OF BUILDING
FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING
UNIVERSITI TEKNOLOGI MARA
(PERAK)
DECEMBER 2018

It is recommended that the report of this practical training provided

By

Muhammad Abdul Jazmi Bin Abdul Harrith

2016458742

Entitled

**PRE-CAST WALL PANEL AND STEEL FRAME CONSTRUCT
BY USING INDUSTRIALISED BUILDING SYSTEM (IBS)**

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

Report Supervisor : Dr. Jida Nianti Binti Mohd Zin.
Practical Training Coordinator : En. Muhammad Naim Bin Mahyuddin.
Program Coordinator : Dr Dzukarnaen Bin Ismail

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

DECEMBER 2018

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 practical training session that I underwent at Asas Bina Enterprise Sdn Bhd for duration of 14 weeks starting from 3rd September 2018 and ended on 7th December 2018. It is submitted as one of the prerequisite requirements of DBG307 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

Name : /Muhammad Abdul Jazmi Bin Abdul Harrith

UiTM ID NO : 2016458742

Date : 18 DECEMBER 2018

ACKNOWLEDGEMENT

First of all I would like to praise to Allah, for giving this opportunity for me to be able to take part in industrial training starting from 3rd September 2018 until 7th December 2018.

By having this opportunity, I would like to thank Mr. Haiqal Bin Rosli and all his team members for giving guidance during my industrial training at Asas Bina Enterprise Sdn.Bhd. They have enabled me to learn and develop my understanding, knowledge and feel of real time projects in this field. From this experiences, I can know what is the best solution to use when having any problems occurred. Without them, I will not be able to complete this task. It is an honour for me to be given the opportunity to 'work' with all of you.

I would also to thank all the UiTM lecturers that have taught and nurtured me in becoming a better student and person. I would also like to extend my deepest appreciation to the lecturers who are directly involved during my training stint. To Dr. Ida Nianti Binti Mohd Zin, Report Supervisor, En. Muhammad Naim Bin Mahyuddin, Practical Training Coordinator and Dr. Dzulkarnaen Bin Ismail, Programme Coordinator I value the time, effort, encouragement and ideas that they have contributed towards the successful completion of my training, this report and the valuable knowledge that have been shared over the last few semesters.

Last but not least, my special thanks to my beloved parents for their sacrifices over the years and always support wherever I go.

Thank you.

ABSTRACT

Industrialised Building System which is more known as IBS is a new construction method that used by the contractors in the world but, still new in Malaysia. It is a building that can be manufactured in factories and also can be casted on the site. Less time needed to construct the building is one of the advantages by using IBS. Installation of wall panel using Industrialised Building System (IBS) was the purpose of the report been made. This report was made based on the project that was still ongoing project which located at Segari near Teluk Senangin. It was a terrace housing project that contains 304 units. This report focus on the method of installing wall panel by using steel frame system and mould, analyse advantages and disadvantages by using this method and to identify the materials that use for the wall panel. Data to complete this report was obtained by using observation and interview methods. Project manager, site supervisor and labors were the persons that involved in this work. IBS will give good results to contractors nor the owner.

	PAGE NO
Acknowledgements	i
Abstract	ii
Contents	iii
List of Tables	v
List of Figures	v
List of Photos	vi
CHAPTER 1.0 INTRODUCTION	
1.1 Background	1
1.2 Objectives	2
1.3 Scope of Study	2
1.4 Methods of Study	2
CHAPTER 2.0 COMPANY BACKGROUND	
2.1 Introduction of Company	3
2.2 Organization Chart	4
2.3 Company Profile	5
2.4 List of Projects	
2.4.1 Completed Projects	6
2.4.2 Projects in Progress	7
CHAPTER 3.0 CASE STUDY	
3.1 Introduction to Case Study	8
3.2 Method for installation wall panel	
3.2.1 Type A	12
3.2.2 Type B	17
3.3 Advantages and disadvantages by using IBS to install wall panel	23

	3.4	Material use in Type A and Type B for wall panel	24
CHAPTER	4.0	CONCLUSIONS	
	4.1	Conclusion	25
REFERENCES			26
APPENDIX			27

LIST OF TABLES

Table 2.1	Company Profile	5
Table 2.2	Completed Projects	6
Table 2.3	Projects in Progress	7
Table 3.1	List of Consultant	11
Table 3.2	Advantages and disadvantages by using IBS to install wall panel	23
Table 3.3	Material use in Type A and Type B for wall panel	24

LIST OF FIGURES

Figure 2.1	Organizational Chart	4
Figure 3.1	Site Organizational Chart	10

LIST OF PHOTOS

Photo 3.1	Site location	8
Photo 3.2	Site layout	8
Photo 3.3	House scheme, Type A	9
Photo 3.4	House scheme, Type B	9
Photo 3.5	Signboard of project	11
Photo 3.6	Type A	12
Photo 3.7	Mould for wall panel	12
Photo 3.8	BRC	13
Photo 3.9	Electrical work	13
Photo 3.10	Window frame	14
Photo 3.11	Coated mould	14
Photo 3.12	Tie rod	15
Photo 3.13	Concrete mould	15
Photo 3.14	Inside the mould	16
Photo 3.15	Formwork	16
Photo 3.16	Wall panel Type B	17
Photo 3.17	Wall panel Type A	17
Photo 3.18	Steel was joined together	18
Photo 3.19	Self-drilling screw	18
Photo 3.20	Drilled hole	19
Photo 3.21	Wedge Anchor and L Bracket	19
Photo 3.22	Netting	20
Photo 3.23	Collated concrete t-nails	20
Photo 3.24	Gap between netting	21
Photo 3.25	Mortar	21
Photo 3.26	Plastering work	22
Photo 3.27	Plaster	22

CHAPTER 1.0

INTRODUCTION

1.1 Background

Industrial building system (IBS) is one of the improved building system that are being introduced to achieve target of faster completion with mass production of the building elements in places out of its final location in a building.

There are various IBS used and can be specified into three majors which are frame or post and beam system, panel system and box system. (Junid, 1986)

In Malaysia, this system is not widely used by the contractors. This is due to the cost that is expensive compared to conventional method. Other than that, lack of experience for the workers to install and manufacturing it. There are various types of IBS in Malaysia. In this project it used steel framing system and mould to form the wall panel.

This system used cast in situ method which steel frame and mould are form at the site. For steel frame system beam, column and roof trusses are made from steel. While mould used to form the wall. It is easy to install and maintenance before and after it is been constructed. It also reduces the waste of building materials.

The method of attaching the steel components has changed from riveting to welding or using nuts, bolts and washers.

This project is carried out at Segari which is located near to Teluk Senangin. It is a terrace housing project that uses IBS and it is different from conventional method. This report provides the installation of wall panel by using Industrialised Building System which are steel frame system and mould until it is finished. Other than that, by using IBS it is designed for a fast construction. The duration of project can be shorten.

This report also provides the material used to form wall panel by using mould and steel framing system.

1.2 Objectives

As for the topic for this report is about installation of wall panel by using Industrialised Building System (IBS) which is steel frame system and mould, there are several objectives that can relate which are:

1. To determine the installing method for wall panel by using steel frame system and plastic mould.
2. To analyse the advantages and disadvantages by using IBS method for installing wall panel.
3. To identify the materials use in Type A and Type B for installing the wall panel.

1.3 Scope of study

The title project is Project Pembangunan Program Khas Perumahan Perwira Negeri Perak (PKPPNP) bagi daerah Manjung, Negeri Perak. It is carried out at Segari, Perak. This report focuses on the method of installing steel framing, advantages and disadvantages by using IBS and materials used.

1.4 Methods of study

1. Observation

By having the opportunity to be placed at the site, the information gained by observed all the works that occurred. As an example, filling mortar inside the steel frame structure. Observation was done from the beginning which was cement, sand and admixture were added until the mortar came out from the tube. To make sure this method stay in the memory and as a record, writing short notes and camera were applied.

2. Interviews

To ensure it was more understand about the works, short interviews between site supervisors and skilled workers was done. All the important points were written in short notes and by taking pictures.

CHAPTER 2.0

COMPANY BACKGROUND

2.1 Introduction of company

Asas Bina Enterprise Sdn.Bhd is a construction company that was founded by Mr Zolkiplee Bin Osman. Their expertise cover all aspects of engineering and construction work including building maintenance work, general building works, civil engineering and mechanical and electrical work. In order to fulfill the market of construction industries nowadays, they are looking forward for the development project especially in residential and commercial specialist.

Asas Bina Enterprise Sdn.Bhd (ABESB) also have dedicated team that makes the company can reach until this level. Always dealing with difficulties makes them become stronger as the quotes that always remembered among their teammates which is ‘‘there is no such thing as a bad soldier’s but yet there is a lousy general’’. Offering good services to their client is also one of the goals that Asas Bina Enterprise Sdn.Bhd (ABESB) wants to achieve

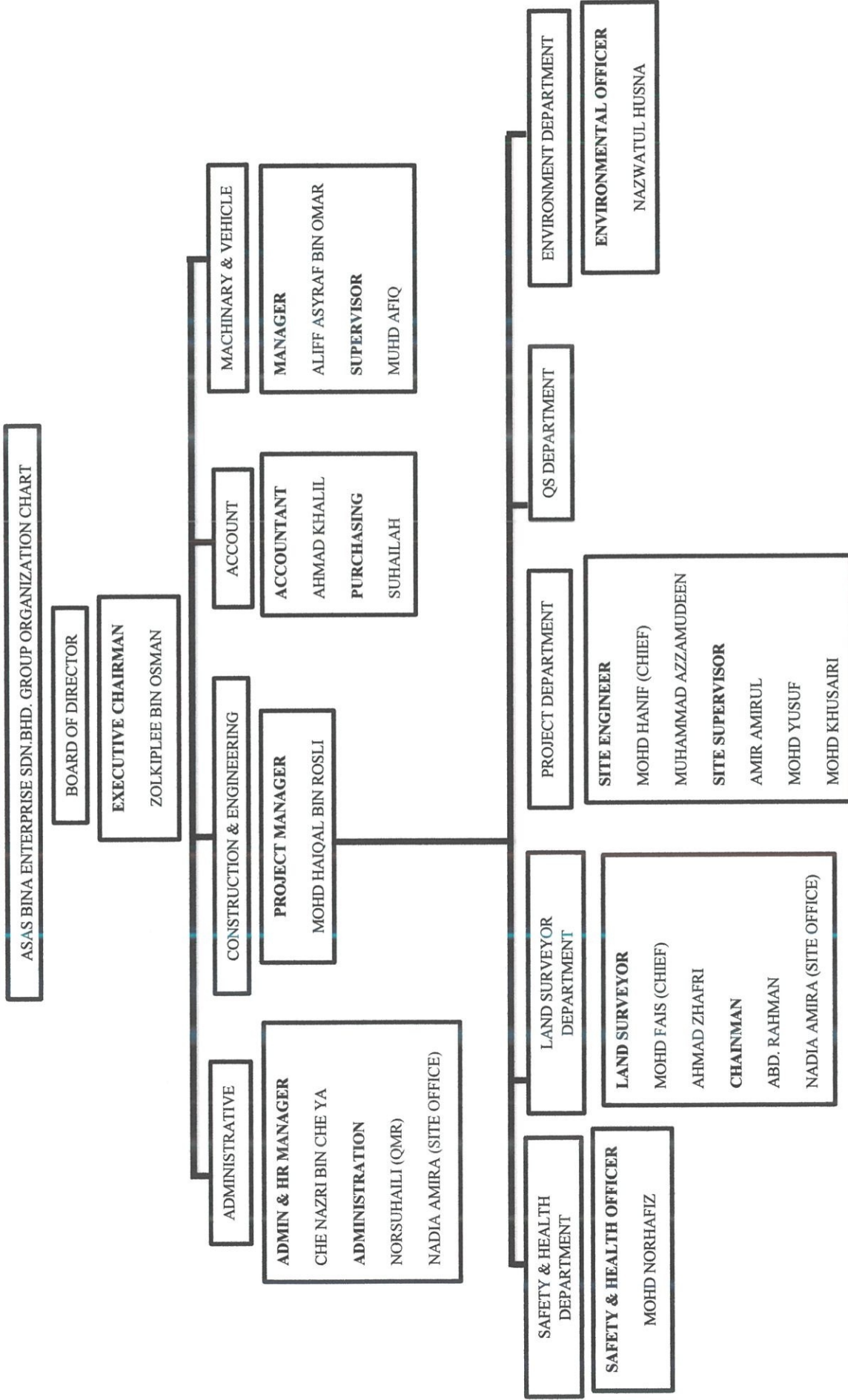


Figure 2.1: Organizational Chart

2.3 Company profile

Table 2.1: Company Profile

Company name	Asas Bina Enterprise Sdn.Bhd
Headquarters adress	142 Tingkat Atas Persiaran PM/2 Pusat Bandar Seri Manjung, Perak Darul Ridzuan
Company registration number	850187-D
ISO registration number	KLR 6021102
Number of shareholder	2
Authorized capital	MYR 5,000,000.00
Share capital	MYR 5,000,000.00
E-mail	asasbina142@yahoo.com abesb2011@gmail.com
Telephone number	
Fax number	
Incorporation date	4 th August 1993

2.4 List of projects

2.4.1 Completed projects

Table 2.2: Completed projects

Item	Project title	Client	Contract value	Start	Finish
1	Services – Umbrella Contract For General Civil Works	Vale Malaysia Minerals Sdn Bhd	RM 1,363,770.00	-	-
2	Proposed Renovation And Complete Club House Kitchen At Teluk Rubiah	Vale Malaysia Minerals Sdn Bhd	RM 317,316.00	-	-
3	Refurbishment Works At Block A35 In Pangkalan Tldm, Lumut	Kd Malaya	RM 1,986,124.80	-	-
4	Refurbishment Works At A30 Rmn Lumut	Kd Malaya	RM 1,634,252.00	-	-
5	Proposed And Construction A Minaret At Masjid Al-Khairiah, Sungai Pinang Kecil, Pulau Pangkor	Pejabat Daerah Manjung	RM 323,995.00	-	-
6	Proposed Construction Of 21 Housing Units Of Sria (Skim Rumah Insan Amanjaya), For The Development Of Desa Bina Upaya, A Structured Settlement,, On State Government Land, In Kg. Tanjung Batu, Mukim Lumut, Daerah Manjung	Yayasan Bina Upaya	RM 1,634,252.00	-	-

2.4 .2 Projects in progress

Table 2.3: List of project in progress

Item	Project title	Client	Contract value	Start	Finish
1	Reclamation Works For The Re-Development Of The Perkampungan Nelayan, Teluk Muroh, Lumut, Manjung, Perak	Jabatan Pengaliran Dan Saliran	RM 32,050,196.40	31 March 2017	Until now
2	Build New Road From Kampung Baharu To Kampung Teluk, Manjung, Daerah Manjung, Perak (Phase 3)	Jabatan Kerja Raya	RM 20,316,459.00	28 April 2017	Until now
3	Project Pembangunan Program Khas Perumahan Perwira Negeri Perak (Pkppnp) Bagi Daerah Manjung, Negeri Perak	Perbadanan Harta Perwira	RM 36,570,000.00	15 May 2017	Until now

CHAPTER 3.0

Case study

3.1 Introduction to case study

This site for this project was located at Tanah Kerajaan, Mukim Lumut, Daerah Manjung, Perak Darul Ridzuan and near to jalan Teluk Senangin. It took 25 minutes from the office to reach there. It also near to site at Kampung Baru which in progress for road works. The project consist of two block of houses which are Type A and Type B. Total units of houses in these two blocks are 304 units. Site location and site layout can be referred to photo 3.1 and photo 3.2.

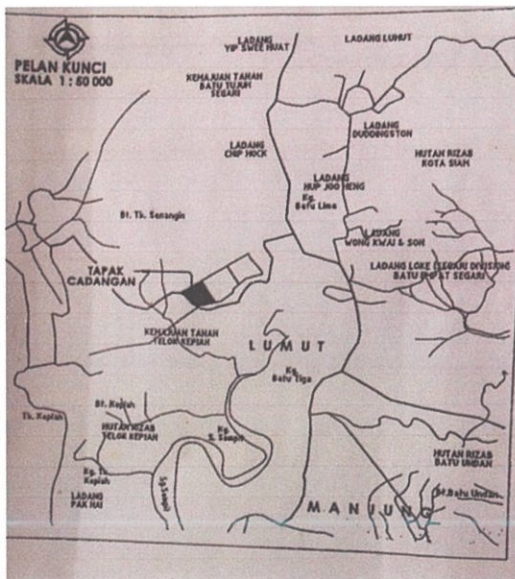


Photo 3.1: Site location



Photo 3.2: Site layout

This was a project for ex-military services that is built by the contractor from Asas Bina Enterprise Sdn.Bhd. Width for house Type A is 900 square feet and for Type B is 1000 square feet. The project started at 15th May 2017 and estimated would finish by 14th November 2018. The cost for this project was RM 36,570,000.00.

Industrialise Building System (IBS) was applied to construct this houses or more detail is to construct wall panel. For these houses, it has similarities with what other houses always have but different from the way it was built. Furthermore, it has two different methods to install the wall panel. One of them was using mould in Type A while the other one is using steel frame system which in Type B. It was different from conventional method which used bricks. Examples of houses that use Industrialise Building System (IBS) are shown as photo 3.3 and 3.4 below.



Photo 3.3: House scheme, Type A



Photo 3.4: House scheme, Type B

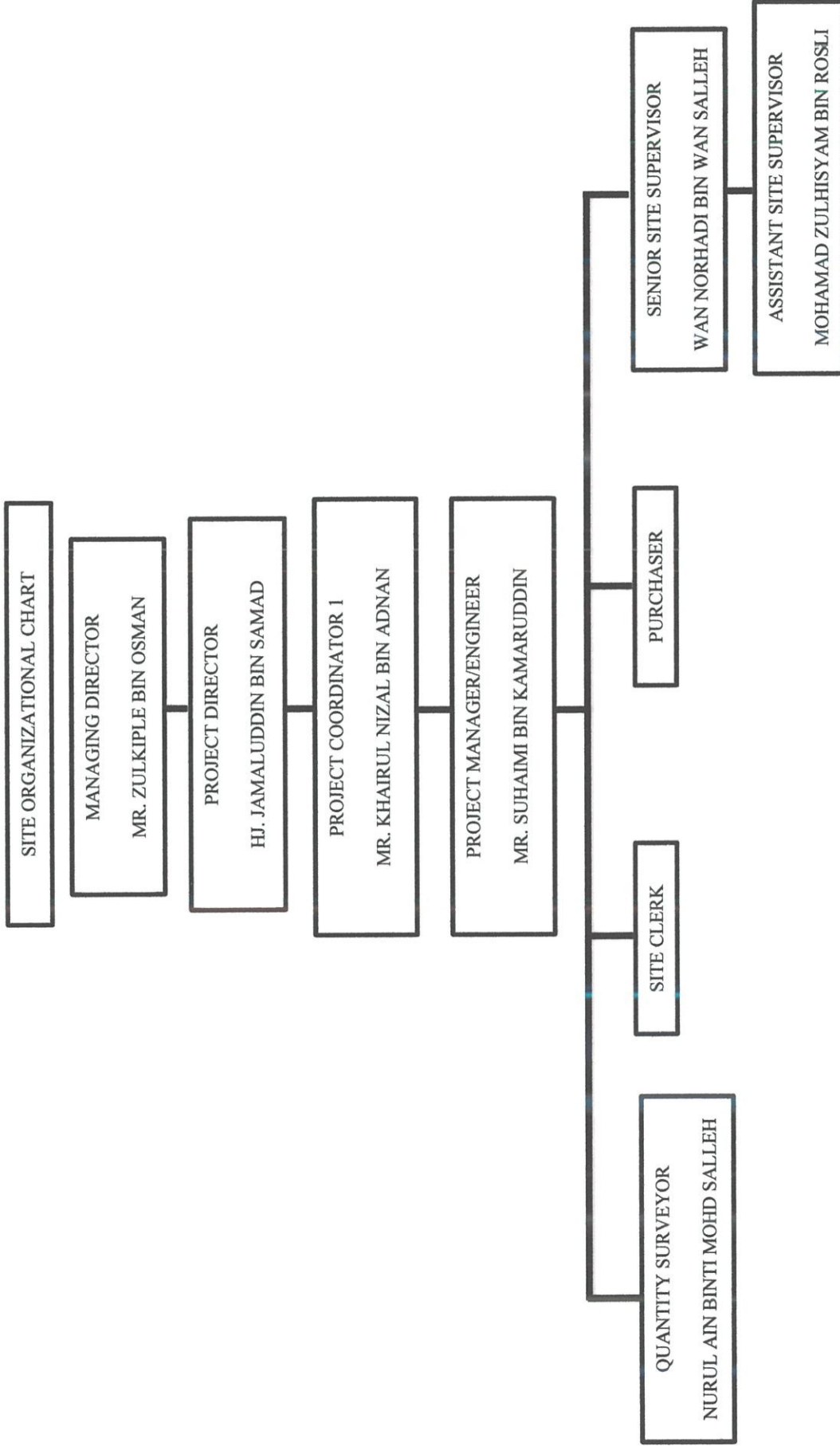


Figure 3.1 : Site organizational chart



Photo 3.5: Signboard of project

List of parties that involved in this project:

Table 3.1: List of consultant

No.	List of consultant	Name of company
1.	Client	Lembaga Perumahan Dan Hartanah Perak
2.	Developer	Perbadanan Perwira Harta Malaysia
3.	Architect	Taufik Aziz Architect
4.	Civil and Structure Engineer	Perunding HJRS Sdn.Bhd
5.	Mechanical and Electrical Engineer	Jurutera Nusantara Bersekutu Sdn,Bhd
6.	Quantity Surveyor	AS2 Consult Sdn.Bhd
7.	Contractor	Asas Bina Enterprise Sdn.Bhd

3.2 Method for installation of wall panel

3.2.1 Type A



Photo 3.6: Type A



Photo3.7: Mould for wall panel

Type A contains 181 unit houses. It was divided into 24 blocks which was A01 until A24. In photo 3.7, mould was used to make internal and external wall between the houses. Crane was needed to lift up the mould into its position as shown in photo 3.6. This mould came in panels. It needs to assemble until it become into wall shaped. By using mould, it can ensure the material are in good quality. This is because the mould was manufactured in factory that have better in technologies.



Photo 3.8: BRC



Photo3.9: Electrical work

Firstly, photo 3.8 shows the installation of BRC type A6. It needs to tie up with the steel that have on the slab. It needs to tie because to make sure BRC did not collapse. Electrical work can be done when it has tied. Furthermore, pipe for wiring need to install inside the wall. For photo 3.9, electrical work was done before wall was concrete because concrete will become harden and the wall will become difficult to break it. Polystyrene need to apply as a cover for the plug to prevent concrete went inside it.



Photo 3.10: Window frame



Photo 3.11: Coated mould

Usually when using conventional method, lintel for window and door need to be constructed inside the wall. But by using IBS in Type A, it just needs the frame. Before concrete, it is important for the mould to be coated with oil. The function of oil is to avoid concrete from attached to the mould and easy to dismantle it. Window frame and coated mould can be referred to photo 3.10 and 3.11.



Photo 3.12: Tie rod



Photo3.13: Concrete mould

Photo 3.12 shows the picture of tie rod. The mould need to be tight because to prevent concrete from bleeding and follow the wall actual shape. Crane was required during concreting work as shown in photo 3.13. It will carry the bucket and pour it inside the mould. When the concrete was poured vibrator is used and will ensure the concrete is free from air bubbles and makes the wall has smooth finishes. For information, the mould can dismantle one day after concrete.



Photo3.14: Inside the mould



Photo 3.15: formwork

Photo3.14 and 3.15 shows the shaped of the wall at Type A after mould was dismantled. Then, it will carry on installation for another unit. For type A wall, it does not have to plaster as it need to be coated with skim.

3.2.2 Type B



Photo 3.16 : Wall panel Type B



Photo 3.17: Wall panel Type A

For this project, it contains two different type of houses which was Type A in photo 3.16 and Type B in photo 3.17. It also required different method of installation for each type. For type B, it used steel structure and it need to be joined together through in-situ. It came in packed. At each packed it has been labeled such as wall, inner wall and so on. It will make sure that the workers can know every part and easy to install.



Photo 3.18: Steel was joined together



Photo3.19: Self-drilling screw

Based on the photo above, steel frame wall was joined together and self-drilling screw was used. It was easier as the steel was not very hard. By using this method, it can save time without need to wait for concrete and bricks. Other than that when there was any mistakes during joining, the screw can be taken out by using screw gun.



Photo 3.20: Drilled hole



Photo 3.21: Wedge Anchor and L Bracket

After that, steel wall structures that have done need to attached to the slab. Hole need to be drilled as shown in photo 3.20. Wedge Anchor and L Bracket (hold down) in photo 3.21 was used to fix the wall frame to the floor slab. It will hold the steel wall in its position and prevent from collapse.



Photo 3.22: Riblath Mesh

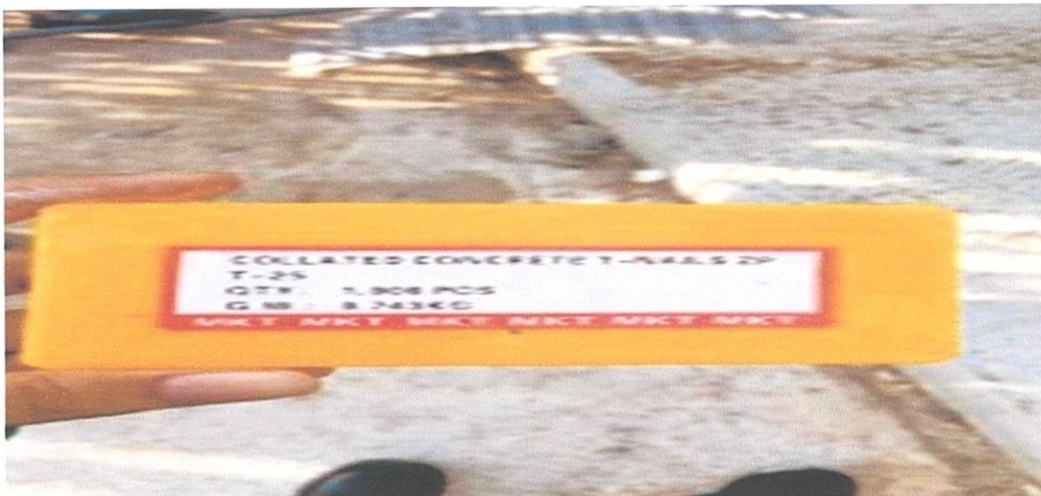


Photo 3.23: Collated concrete t-nails

Before mortar was filled, Riblath Mesh was attached to the steel wall structure. Collated concrete t-nails were used to attach the net to the structure. It can be referred on the photo above. The net can be easily cut based on the length or shape that was needed.



Photo 3.24: Gap between netting



Photo 3.25: Mortar

Photo 3.25 shows mortar was filled after Riblath Mesh was fully attached. Mortar that made from cement, sand and admixture was mixed together in mortar pump. Then, it will flow through the pipe to the definite places. Before that, gap between the net need to fill up to prevent from spilt as shown in photo 3.24. Mortar will make the wall become stronger to withstand pressure.



Photo 3.26: plastering work








Photo 3.27: Plaster

Plaster need to apply on top of the wall surfaces as finishing. For plaster works, it was still in process at block B08, B09 and B11. This work cannot be done during rain. So, it will affect the duration of time to complete the houses. photo 3.26 and 3.27 shows the plastering work.

3.3 Advantages and disadvantages by using IBS to install wall panel

Table 3.2: Advantages and disadvantages by using IBS to install wall panel

Advantages	Disadvantages
 <p>1. Less use of formworks and nails that can cause danger to the workers.</p>	<p>Lack of experience for workers that cause many mistakes during installation of the wall.</p>
 <p>2. Faster installation duration for wall panel</p>	<p>Lack of trust from people of IBS system compared to conventional.</p>
 <p>3. Cleaner site due to less materials and construction waste.</p>	<p>Cost for IBS is quite expensive.</p>
 <p>4. The wall can withstand more pressure, have more strength and long lasting duration.</p>	<p>A lot of machineries and electric used during the installation period.</p>
 <p>5. Fewer workers are needed during installation.</p>	<p>Difficult to extend building as the wall is totally steel and hard to break it.</p>

3.4 Material use in Type A and Type B for wall panel

Although Type A and Type B focus on the construction of wall panel, but both of them have different type of material used. As been stated before, for Type A it used mould while Type B used steel frame system. The differences of materials are listed in the Table 3.3 below.

To form a wall in Type A, Brc size A6 was tied with each other. it needs to tie because to prevent the Brc from collapsed. Then, plastic mould was form and attached together for both sides. Concrete was poured inside the mould. The concrete used grade 35 to get high strength to withstand the pressure.

For Type B, steel frame was connected with each other by using self-drilling screw. The frame needs to attach to the slab by using Wedge Anchor and L Bracket. It will hold the frame and prevent the frame from collapse. Riblath mesh was attached to the frame. It acts as barrier for the mortar from split out. After mortar has harden, plaster need to apply on top of the frame.

Table 3.3: Material use in Type A and Type B for wall panel

Item Type A	Item Type B
 <p data-bbox="397 669 491 705">Mould</p>	 <p data-bbox="959 651 1110 687">Steel frame</p>
 <p data-bbox="368 1055 520 1090">Brc size A6</p>	 <p data-bbox="943 1088 1126 1124">Riblath Mesh</p>
 <p data-bbox="384 1547 504 1583">Concrete</p>	 <p data-bbox="983 1547 1086 1583">Mortar</p>

CHAPTER 4

CONCLUSIONS

4.1 Conclusion

Based on CIDB Malaysia, IBS have six main groups. They are precast concrete framing, panel and box system, steel formwork system, steel framing system, timber framing system, block work system and innovative system. To achieve towards a developed nation, it is important to know one of those elements. From the way it was made until fully constructed.

By having the opportunity to know the system which is steel framing system and mould, it is also important to know the materials that used in order to produce a wall panel. This is because to avoid wrong items to be ordered. It will affect the cost and duration of the work.

Besides, the process of installation of the system can be obtained by observing step by step that used by labors. Installation process of the system should be controlled to avoid any mistakes from occurred. While doing works, safety must be complied to prevent any accident occurred and will cause trouble for managing department.

From the study, the most important aspect is to always know how the installations are as well as how to solve any problem that may occurs during the work.

REFERENCES

1. Junid, S.M.S (1986). Industrialised building system. Proceedings of a UNESCO/FEISEAP Regional workshop, UPM Serdang
2. Construction Technology 5th Edition by R.Chudley (2011) Pearson Education publisher
3. Company profile of Asas Bina Enterprise Sdn. Bhd
4. CIDB Malaysia. (2014). Industrialised Building System.