UNIVERSITI TEKNOLOGI MARA

DEPARTMENT OF BUILDING

FACULTY OF ARCHITECTURE, PLANNING AND SURVEYING

UNIVERSITY TECHNOLOGY MARA

(PERAK)

OKTOBER 2013

It is recommended that this practical report provided

By

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2011604816

entitled

Mivan Formwork

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

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DEPARTMENT OF BUILDING

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SEPTEMBER 2013

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 HAB Construction. 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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Date : 30 SEPTEMBER 2013

ACKNOWLEDGEMENT

First, I would like to praise my hand to Allah for guidance because this Practical Training Report can complete in time. Thanks to Mr. Tan Yew Hock as Project Manager of West Site 2, those give a lot of information about construction fields. He not shows any exhausted when teach us. It is so many things that needed to know and learn about construction. I would like to say thanks to Pn. Fatihah binti Arzmi as Assistant Site Engineer that always give support and inducement to me about the reality life in construction site. She teaches me on how to handle general worker doing their work and most importance is how to read drawing on site. Also thanks to MFE sub-contractor Sharin Saharodin, which give co-operate to me for finish up this Report Practical Training. I also want to say thanks to my parents that give support, my friend Muhammad Bisyru bin Nordin and others who cannot be mentioned here.

Without supporting and guideline from them this report might be cannot finish up at the time. They are many hindrances that might be emerging while doing this report. Nevertheless, with pray to Allah and supporting from them, this report finally can be finished.

ABSTRACT

This report briefly explains about component and method of installation for the new technology of formwork system known as Mivan Formwork. Mivan Formwork has been used widely in construction site for *"Cadangan Membina Sebuah Pangsapuri 41 Tingkat (338 unit) (West site 2) Dan Kemudahan Penduduk Serta 6 Paras Podium Tempat Letak Kereta, Sky Bridge Dan 1 Unit Pondok Pengawal Di atas Lot 25951, Jalan Residen Utama, Desa Parkcity, Mukim Batu, Wilayah Persekutuan Kuala Lumpur"*. This report is finished from my experience and observation that is achieve while having practical training. Mivan Formwork installation is not simple as we thought at first. The installation of Mivan Formwork is difficult and need supervision from the expert to ensure the Mivan Formwork in correct assembly.

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LIST OF ABBREVIATIONS

UiTM	Universiti Teknologi Mara
RC	Reinforcement
BRC	Bar Reinforcement
HABC	Haw Ah Bee Construction
SDN. BHD	Sendirian Berhad

CHAPTER 1

INTRODUCTION

1.1 Introduction

The industrial training program is required for each student who taken Diploma in Building (AP116) in 5th semester. This practical training duration is about 20 weeks. Students have to undergo industrial training at one of the companies that has been choosing by them. The course code for this subject is DBN 307. While having industrial training, all practical students must have their own practical logbook to record on what he/she has done every day for the training industry. Other requirement for this subject is to choosing one topic by the student with the cooperation of lectures and supervisors.

From that, I have undergone training in one of my industrial construction company located at Desa Park City, Kuala Lumpur. During the training period, I have been trying to achieve the training objectives in this industry. The project is about *"Cadangan Membina Sebuah Pangsapuri 41 Tingkat (338 unit) (West site 2) Dan Kemudahan Penduduk Serta 6 Paras Podium Tempat Letak Kereta, Sky Bridge Dan 1 Unit Pondok Pengawal Di atas Lot 25951, Jalan Residen Utama, Desa Parkcity, Mukim Batu, Wilayah Persekutuan Kuala Lumpur".* To full fill this project, I need to carried out the daily work progress and record it.

I choose report about component and method installation of Mivan Formwork. The sub-contractor that responsible for installing this formwork is MFE Formwork Technology. Mivan Formwork can give more advantages than common formwork. It is more efficient, safe cost and time.

1.2 Objectives

The objectives of this study are as follow:-

i) To identify all the component of Mivan Formwork.

ii) To study the method statement of Mivan Formwork.

1.3 Scope of Study

There is a lot of information that has been obtained by experience during industrial training for 20 weeks. The scope of study for this report was to identify component of Mivan Formwork and describe the method of using installation Mivan Formwork. Experience is importance to give knowledge to me to get more and more understanding. For more explanation I also get information from some of the worker, searching the internet, and reference from book.

Mivan is a new technology of formwork that give us more advantage to overcame less cost and reducing time wastage. In addition, Mivan Formwork is suitable for high rise building such as condominium, apartment, and others. Mivan Formwork produces complete design from column, beam, wall, and others part. The formwork than being applied from the first level, then being take off to the other floor. This process needed to get the same shape and design for every floor. I have been affinity to learn details about this new technology and choose this Mivan Formwork as my report title. Through from my experience, the method of installation process of Mivan Formwork can be produce for this report. The scope of study comprises the component and installation of this type of formwork for Westside Two Residency.

1.4 Method Of Study

This report is finished through several methods:

i. Reference

For extra knowledge, I have referred to the books that are concern to the subtopic. With this method, I can increase the understanding of the work.

ii. Interviews

When there any convincing understanding theory, I need to make comparison between theory and on site situation. Interviewed is the best way to solve this problem.

iii. The electronic media

This is the other sources of additional information needed to give more understanding. The information is available from site related and downloading.

iv. Observations

Observation, the best way to understanding and reduce the reasonable question. In addition, this method can give a lot of information either theoretical or practical.

CHAPTER 2

COMPANY BACKGROUND

2.1 Introduction

Haw Ah Bee Construction (HABC) are the one of the leading construction companies registered with CIDB under the G7 grading as well as with the Contractor Service Centre (PKK), Class 'A'. This company has established in the seventies and then later registered as a private limited company in 1981. HABC is starting from humble beginning as a subcontractor carrying out sub-structure works that undertaking all form of foundation and building contract. From that beginner this company has trying to achieve more goals and get shine brightly.

Haw Ah Bee, is a chairman that have more than 30 years' experience in construction fields. He is the one that involve in constructing and building the property developments of Bangsar Maju. Haw Ah Bee has saw the potential to convert from labor-intensive method to the new present use of new technology in plants, material, and equipment. Then he tries to use new technology in construction, than he establishes the company. (Source from Haw Ah Bee Construction)

2.2 Organization Chart

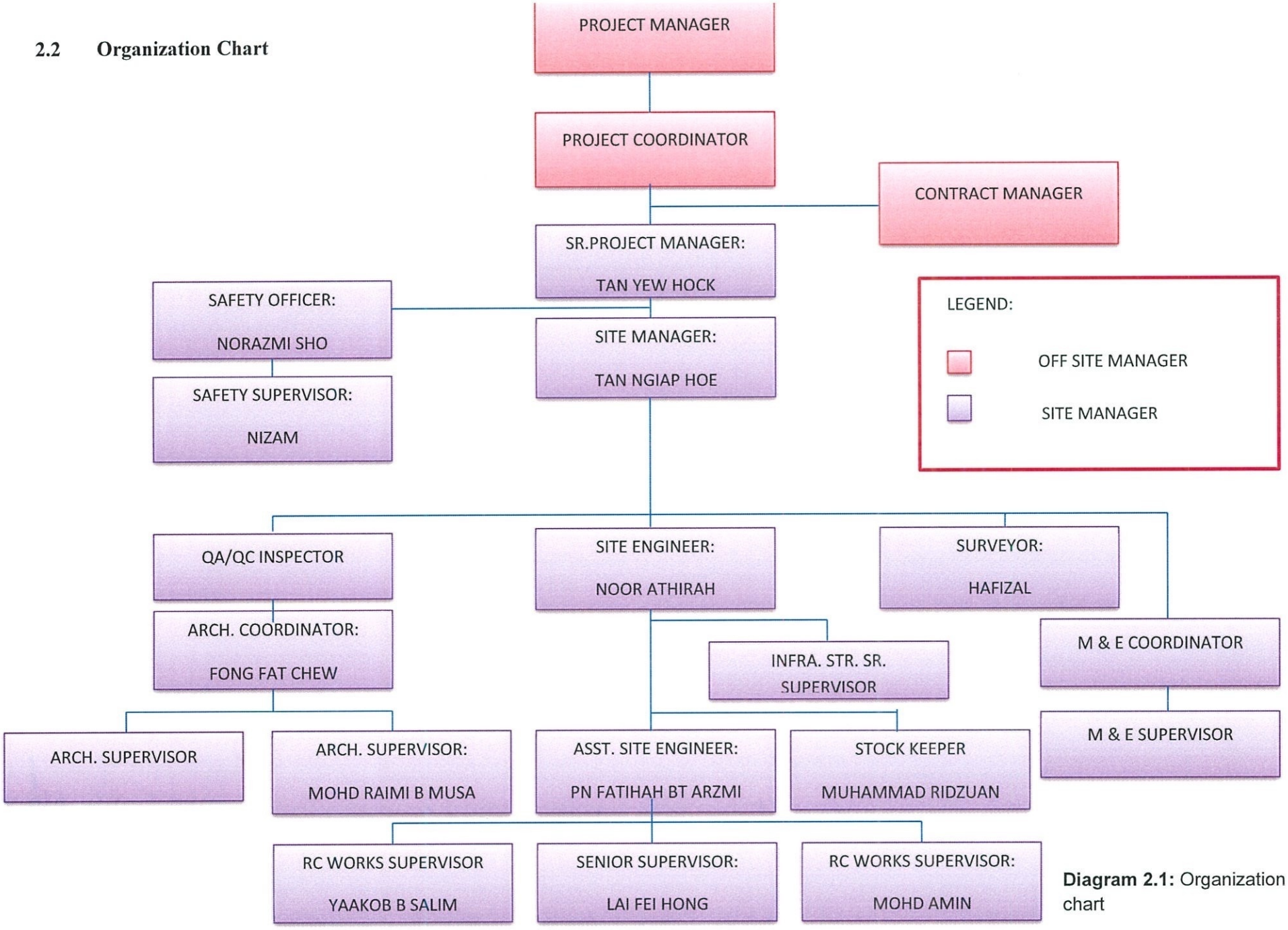


Diagram 2.1: Organization chart

Source: HABC Sdn. Bhd.

2.3 Project List

2.3.1 Project That Has Done

Almost 32 years' experience in the construction field relating to builder, this shows Haw Ah Bee Construction (HABC) capacity in handling and deliver of projects that have entrusted. This has proven when Haw Ah Bee Construction (HABC) has completed more than 15 projects involving construction work, foundation work and work related to this field. Many projected that has done either government or private. The projects that have and are being conduct or operated by Haw Ah Bee Construction (HABC) are:

Table 2.1: List of completed project

PROJECT NAME	CONTRACT VALUE	COMMENCEMENT	COMPLETION
1) Cadangan Pelan Membina Longkang Besar di Jalan SS7/19 (Di Antara Kelana Center Point Dengan Jalan SS7/26), Kelana Jaya, Mukim Damansara, Daerah Petaling, Selangor Darul Ehsan.	RM 6,769,380.83	15-03-2007	15-07-2007
2) Cadangan Pembangunan 3 Block Pangsapuri 28 TK, yang Mengandungi 572 Unit Kediaman di atas Lot 220, 221 dan PT 171, Sek. 83, Jln Ipoh, Bandar raya Kuala Lumpur - R1.	RM 17,330,000.00	15-07-2006	15-04-2008

PROJECT TITLES	CONTRACT VALUE	COMMENCEMENT	COMPLETION
3) Cadangan Tambahan Ruang Pameran 1 Tingkat dan Pejabat 4 Tingkat Pada Bangunan Gudang 1 Tingkat Sedia ada di atas Lot 11, Jalan 225, Sek.51A, Petaling Jaya, Selangor.	RM 6,389,666.86	10-05-2009	09-01-2010
4) Proposed Development of a 40 Storey Office Tower 2 On Lot 159, Sectic 40, Jalan Raja Abdullah/Munshi Abdullah, Kuala Lumpur.	RM 199,672,342.43	11-04-2008	12-08-2010
5) Cadangan 2 Blok Bangunan Pejabat 21 TK. Di atas 2 TK. Podium dan 2 Tingkat Basement Tempat Letak Kereta di atas Lot 62539, JLN SD 12/5, Sri Damansara, Mukim Sungai Buloh, Daerah Petaling, Petaling Jaya – Eathworks and Sub-structure.	RM 18,000,000.00	01-10-2009	31-12-2010

2.4.2 Projects under Construction

Apart from the mentioned projects, there are several projects which are under construction. These include:

- Construction of Conference Hall and Car Park for Bukit Tinggi Resort Bhd.
- Construction of various 392 residential units in Kuala Muda Kedah
- Construction of various service apartments, linked-houses, and bungalows in Petaling Jaya.
- Piling work for Bungalows in Bukit Tinggi Resort Bhd.
- Piling work for Medical Teaching Block in Seremban Hospital
- Piling work for Factory and Exhibition Hall in Pusat Bandar Puchong

CHAPTER 3

CASE STUDY

3.1 Introduction of Mivan Formwork

According to Archeng (n.d) staled, that Mivan is also known as, Aluminum Form System that been used extensively in the construction of housing units and mass housing projects. Mivan Formwork is effective than common formwork, because it is fast, simple, adaptable and cost effective. It produces a number of qualities of work that requires minimal maintenance and when durability is a major consideration.

Mivan Formwork is more congruent for a high-rise building. This formwork just need one continuous pours of concrete from slab through wall. The frames of windows, door, and staircase flights are install in the form before concreting assembly. Normally elimination achieves from a hot air curing or curing compound. The other way is pouring the hydraulic oil to the surface of the Mivan Formwork while installing. This will dodge from concrete adherent to the formwork.

In addition, this Mivan Formwork is using cast - in - situ concrete walls and floor slabs cast monolithic structural system provides in one continuous pour. This will forms a large room sized for walls and floors slabs erected on site. This form made from a strong and sturdy, made with accuracy and easy to handle and give a large number of repetitions (about 250).

Sharin Saharodin and Sarul Yasin (2013) claims, that Mivan is easier to carry out than common formwork. Mivan Formwork made from aluminium and much more light than plywood. In addition, Mivan Formwork is more durability, strong, cheap and more efficient. They also said that Mivan is not taking much time to install and can reduce the waste of time.

Sharin Saharodin and Sharul bin Yasin is a subcontractor from MFE Formwork Technology Sdn. Bhd. This company provides designs and manufactures formwork solutions for building construction applications. This company offers aluminum based on construction system for forming cast in place of reinforced concrete building structures for the residential sector. MFE Formwork Technology Sdn. Bhd. was formed known as Mivan Far East Sdn. Bhd. and changed its name to MFE Formwork Technology Sdn. Bhd. in July 2007. The company was establish in 1991 and based in Petaling Jaya, Malaysia. It has additional offices in Malaysia, India, Dubai, and China, as well as operations in Singapore, Hong Kong, Abu Dhabi, Thailand, Romania, Oman, Sri Lanka, Egypt, and Libya, adapted from MFE Formwork Technology 2007.

3.2 Project Background

General

Project title :

"Cadangan Membina Sebuah Pangsapuri 41 Tingkat (338 unit) (West site 2) Dan Kemudahan Penduduk Serta 6 Paras Podium Tempat Letak Kereta, Sky Bridge Dan 1 Unit Pondok Pengawal Di atas Lot 25951, Jalan Residen Utama, Desa Parkcity, Mukim Batu, Wilayah Persekutuan Kuala Lumpur."

Contract Sum	:	RM 161,332,519.12
Test site location	:	Desa Parkcity, Kuala Lumpur
Employer	:	Perdana Parkcity Sdn. Bhd.
Architect	:	Environmental Design Practice Sdn. Bhd.
Civil/Structural Engineer	:	G & P Structures Sdn. Bhd.
Mechanical/Electrical Engineer	:	Perunding Mektrik Sdn Bhd.
Quantity Surveyor	:	Baharuddin Ali & Low Sdn. Bhd.
Landscape Architect	:	Praxcis Design Sdn. Bhd.
Lighting Consultant	:	Z' Lights Illuminazione
Security Consultant	:	GDSS System Sdn.Bhd
Main Contractor	:	Hab Construction Sdn.Bhd.

3.3 Case Study

3.3.1 Component of Mivan

According to Archeng (n.d), Mivan Formwork made from aluminium rail section that welded to an aluminium sheet. Mivan Formwork has a lightweight panel that easy to conduct. In addition, Mivan Formwork has an excellent stiffness to weight ratio and yielding minimal deflection under concrete loading. This formwork is manufacturing based on requirement of shape that needed. The panel of this formwork are made from aluminium alloy that highly strength with a 4 mm thick skin plate and 6 mm thick ribbing behind to support the panels.

Mivan Formwork produces in large factories of MFE Formwork Technology Sdn. Bhd. The component of the Mivan Formwork normally will finish in a three month from the day ordered. There are many types of Mivan Formwork shape and purpose. The following are the usually used in the construction

List of components that Mivan Formwork for this project is:-

a) Wall component - Wall panel, Roker, Kicker, Stud Pin, and Tie.
b) Beam component - Beam Side Panel, Prop Head and Beam Soffit Bulkhead.
c) Deck component - Deck Panel, Deck Prop, Prop Length, Deck Mid, Soffit Length and Deck Beam Bar.
d) Other component - Internal Soffit Corner, Deck Soffit Corner and Internal Corner

3.3.2 Wall Component

1) **Wall Panel: -**

It made from aluminium sheet, property been cut into the fit of the size and forms the face of the wall.

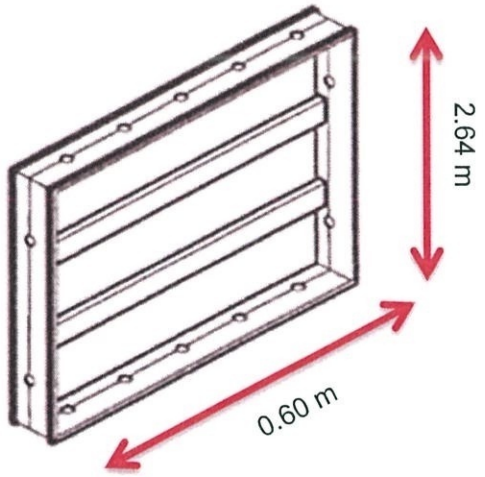


Photo 3.01: Wall Panel

Source: architectjaved.com (n.d)

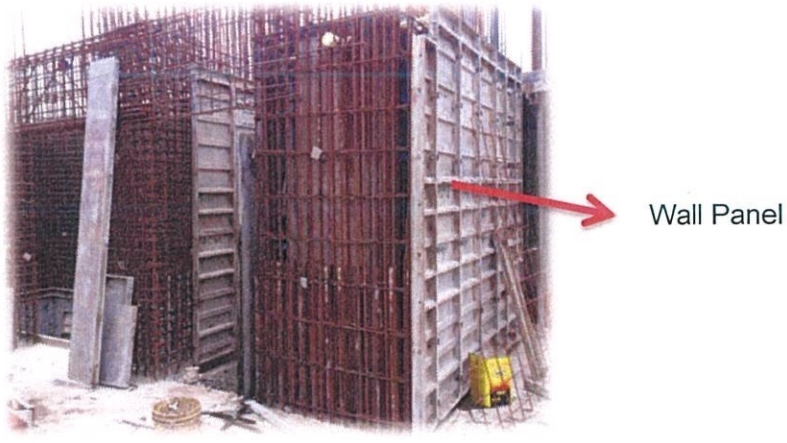


Photo 3.02: Wall Panel

2) **Rocker: -**

It made from L shaped panel having allotment holes for stub pin. It is use for supporting component of wall.

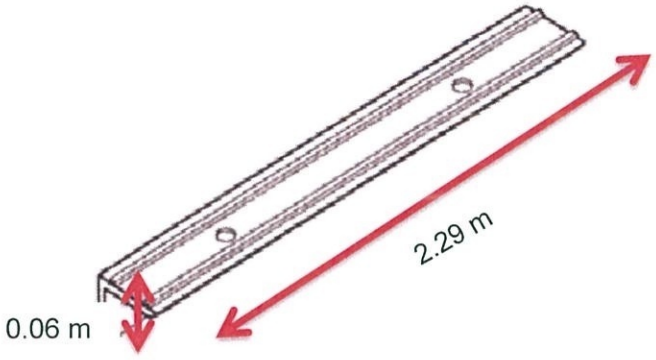


Photo 3.03: Rocker

Source: architectjaved.com (n.d)

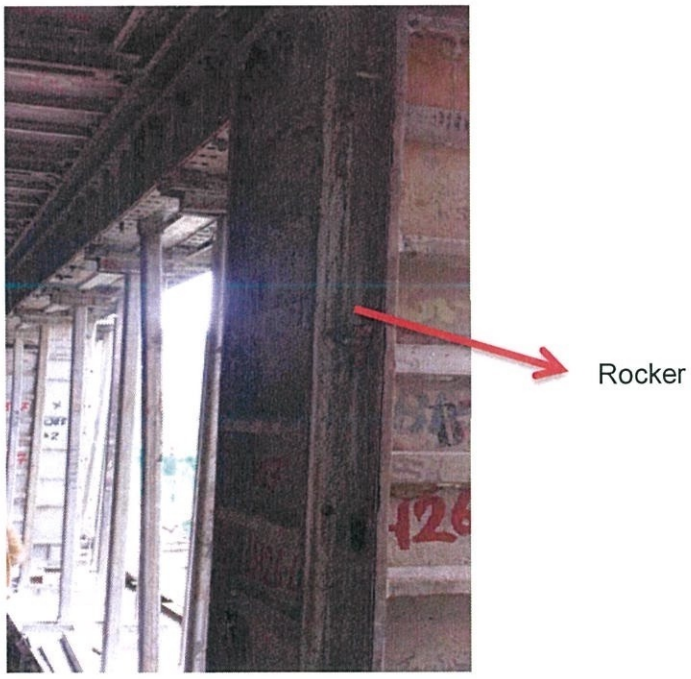


Photo 3.04: Rocker

3) **Kicker: -**

It made as a ledge to support wall face at the top of the panels.

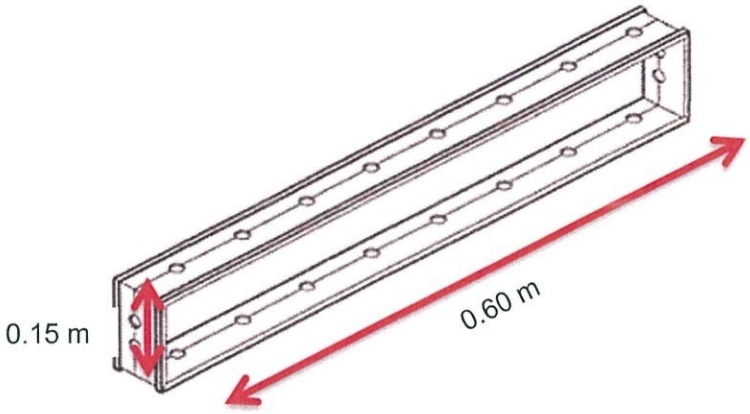


Photo 3.27: kicker

Source: architectjaved.com (n.d)

Photo 3.27: kicker

4) **Stub Pin: -**

It made for joining two wall panels and joining two joints.

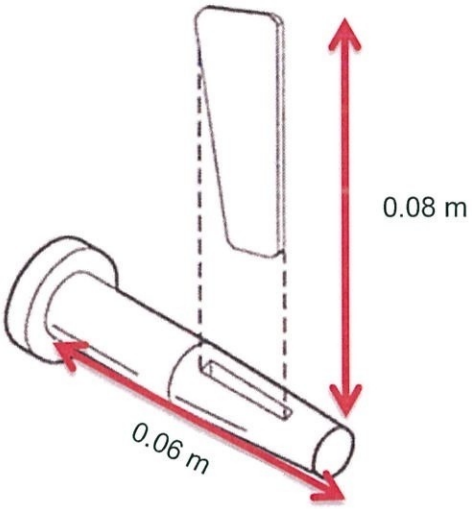


Photo 3.29: Stub Pin

Source: architectjaved.com (n.d)

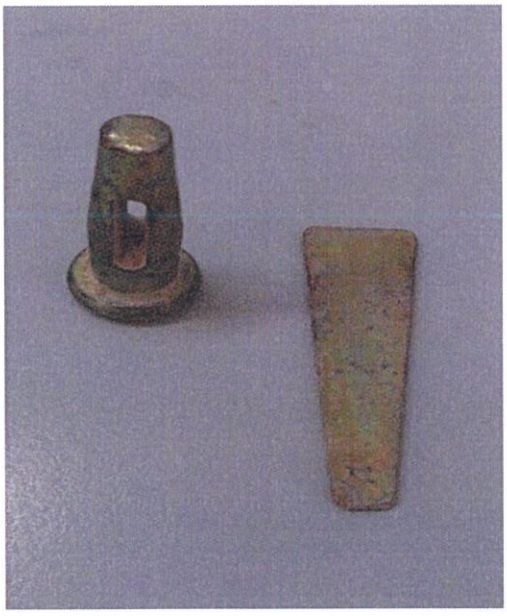


Photo 3.30: Stub Pin

5) Tie : –

It is use for holding the wall panel side by side. It is use with stub pins.

Photo 3.1: Tie

3.3.2.1 Mivan Formwork for Wall Assembly

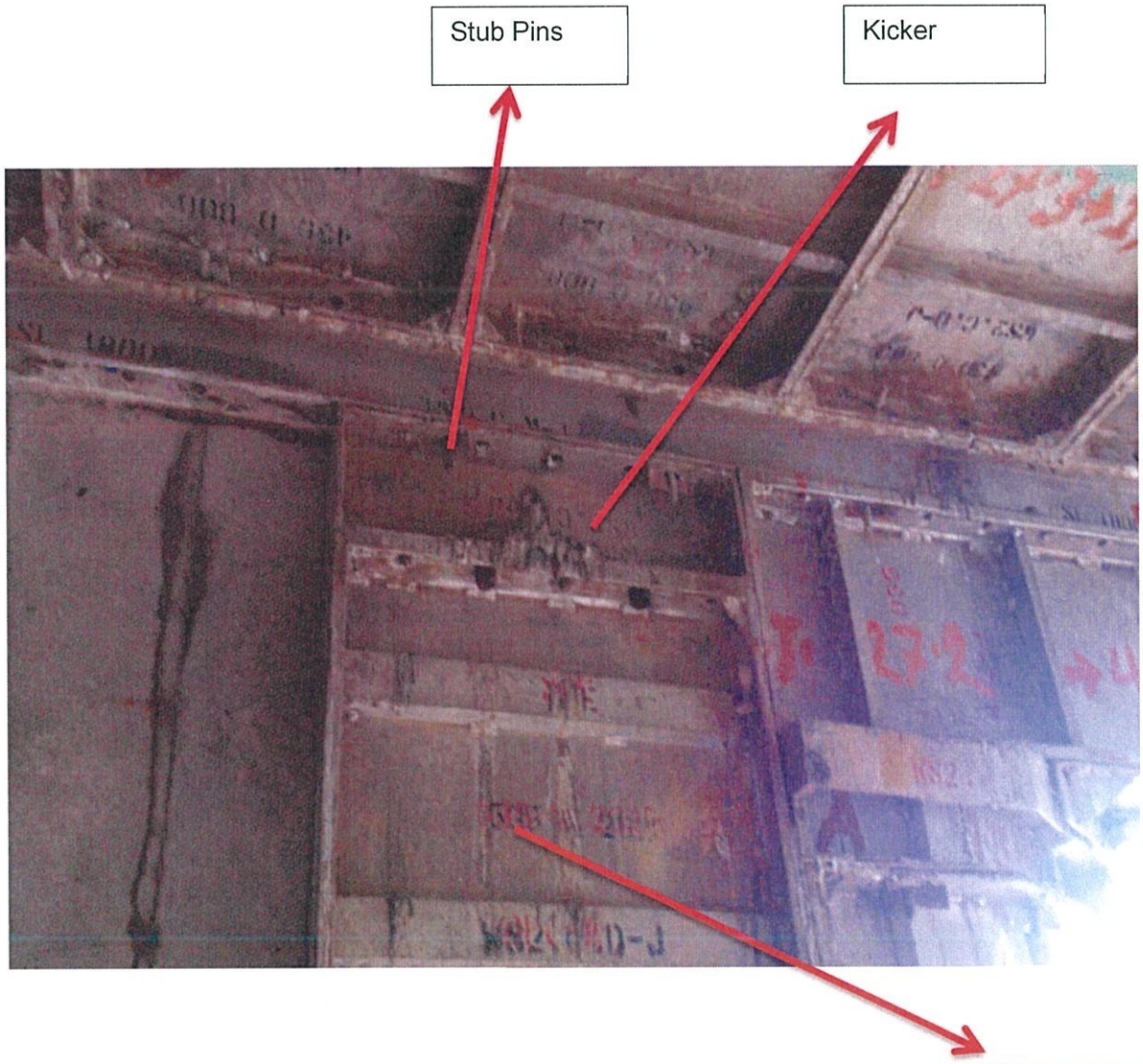


Photo 3.1: Mivan formwork for wall assembly

3.3.2 BEAM COMPONENT

1) **Beam Side Panel: -**

It is use for the side of the beams. The size is depending on the beam.

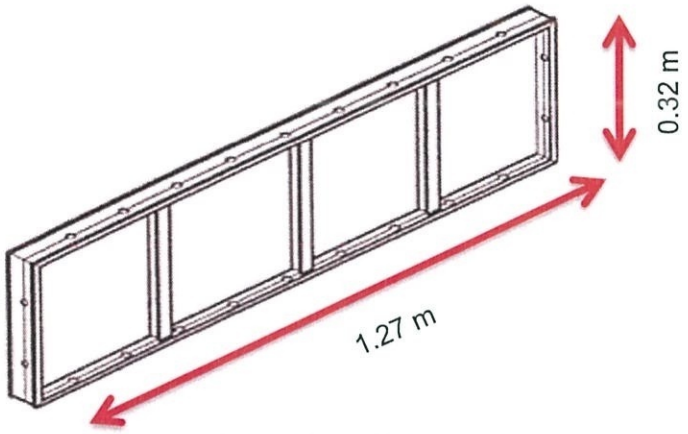


Photo 3.11: Beam Side Panel

Source: architectjaved.com (n.d)

Photo 3.12: Beam Side Panel

2) **Prop Head for Soffit Beam: -**

It forms the soffit beam. It has a V-shaped head that easier for removing formwork.

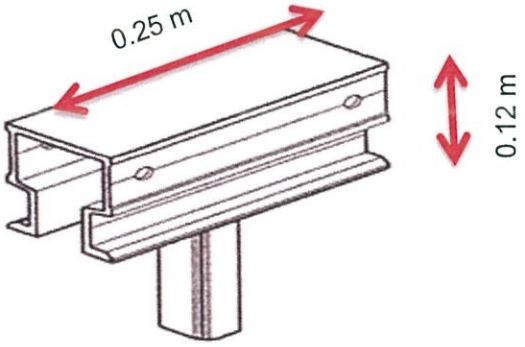


Photo 3.13: Prop Head for Soffit Beam

Source: architectjaved.com (n.d)

Photo 3.14: Prop Head for Soffit Beam

3) **Beam Soffit Bulkhead: -**
It is made for carries most of the load from beam. It is strong and not easier to damage.

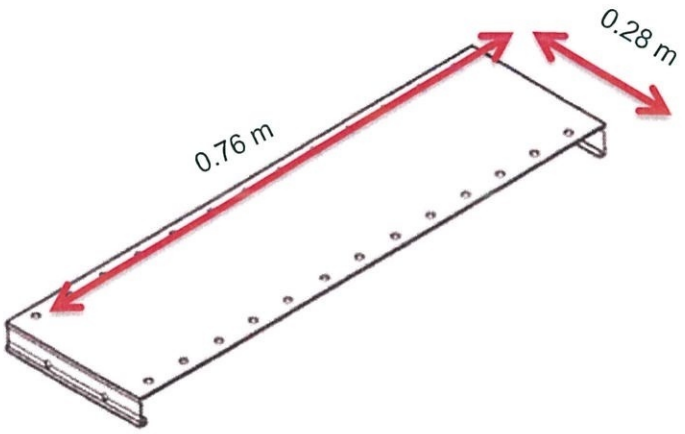


Photo 3.15: Beam Soffit Bulkhead
Source: architectjaved.com (n.d)

Photo 3.16: Beam Soffit Bulkhead

3.3.3.1 Mivan Formwork for Beam Assembly

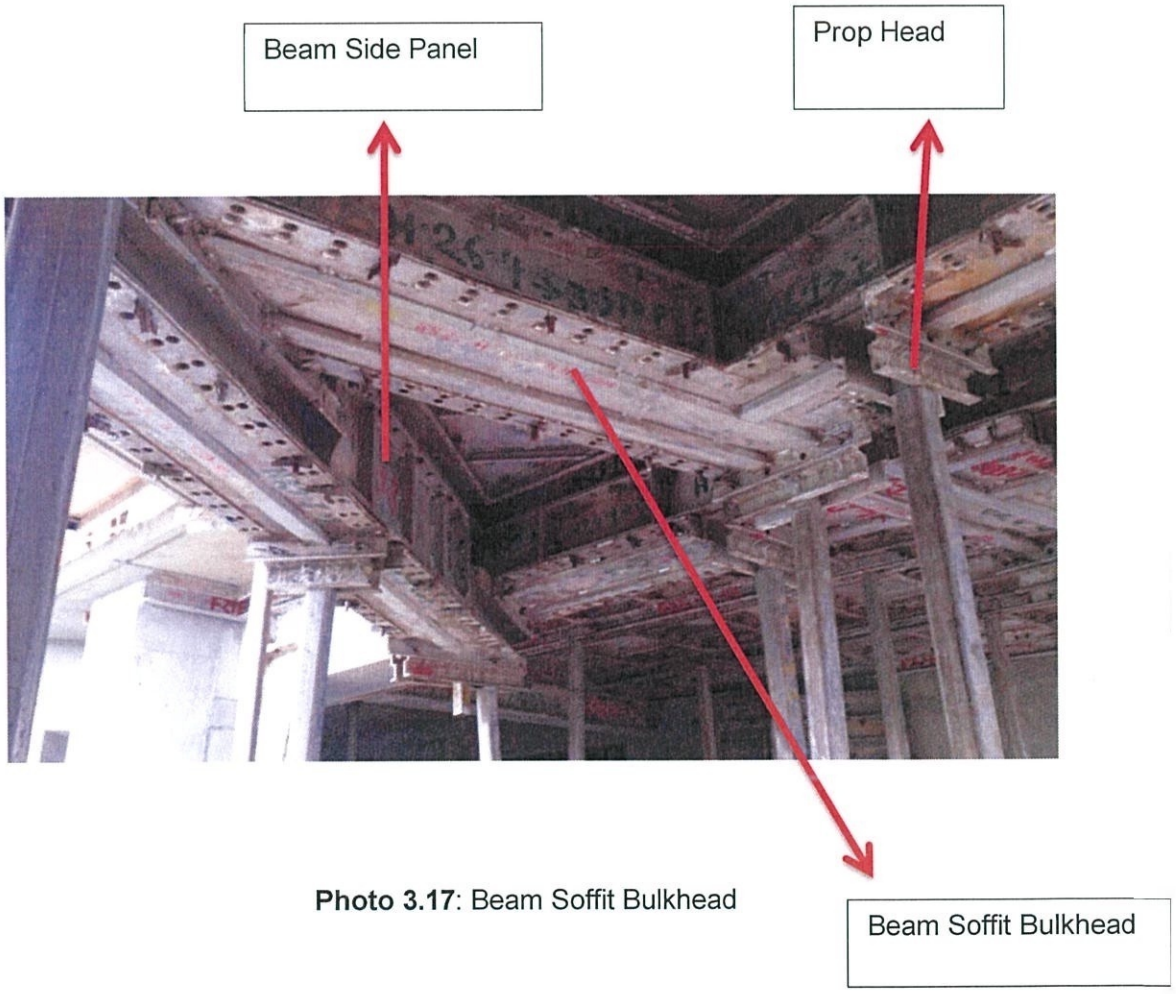


Photo 3.17: Beam Soffit Bulkhead

3.3.3 Deck Component

1) **Deck Panel: -**

It is made for safety of the worker that walks through it. It has a horizontal surface for casting of slabs.

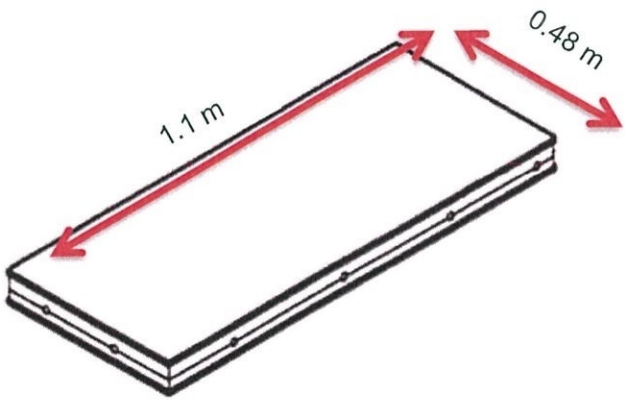


Photo 3.18: Deck Panel

Source: architectjaved.com (n.d)

Photo 3.19: Deck Panel

2) Deck Prop: -

It known as a V-shaped prop head. It use for supporting deck and the entire component ahead. Prop head needed for bears the upper load.

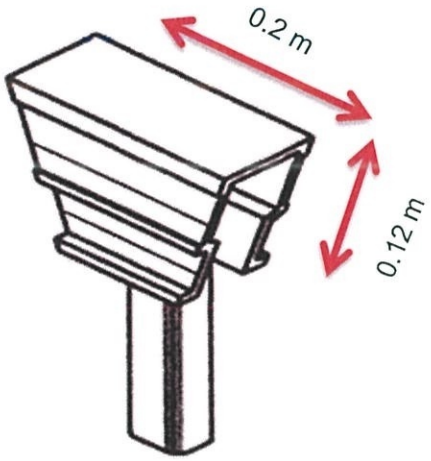


Photo 3.20: Deck Prop

Source: architectjaved.com (n.d)

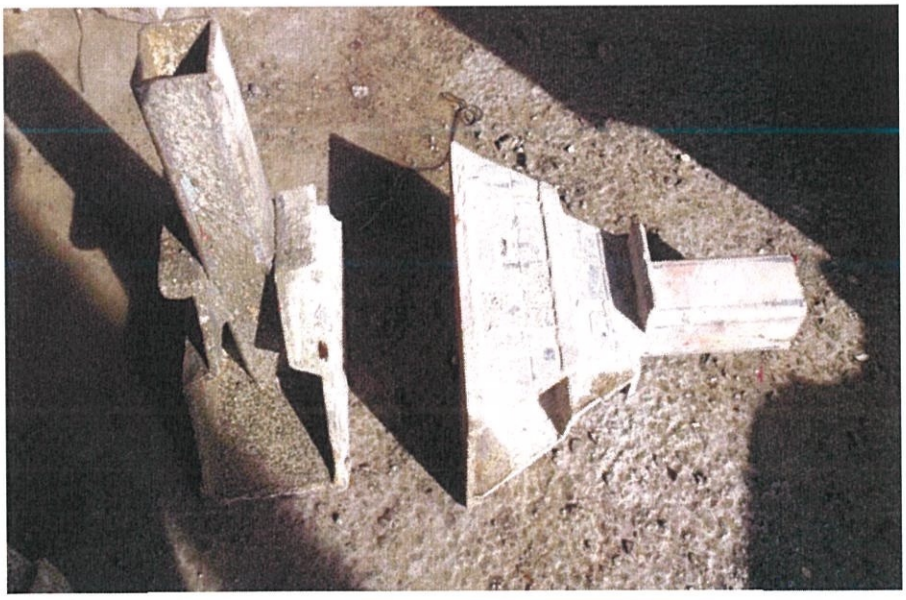


Photo 3.21: Deck Prop

2) **Prop Length: -**

It is use with deck prop. The connection between these components will bear the load. The length of prop length is depending on the length of slab.

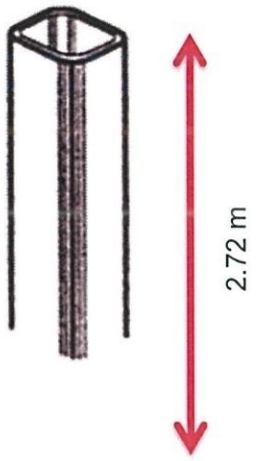


Photo 3.22: Prop Length

Source: architectjaved.com (n.d)

Photo 3.13: Prop Length

3) **Deck Mid – Beam: -**

It is made for holding the concrete, needed to support the middle portion of the beam.

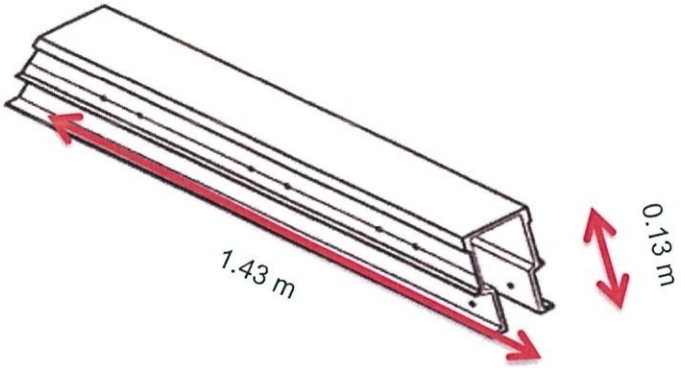


Photo 3.24: Deck Mid – Beam

Source: architectjaved.com (n.d)

Photo 3.25: Deck Mid – Beam

4) **Soffit Length: -**

It made to give support to their perimeter of the room especially at the edge of the deck panels.

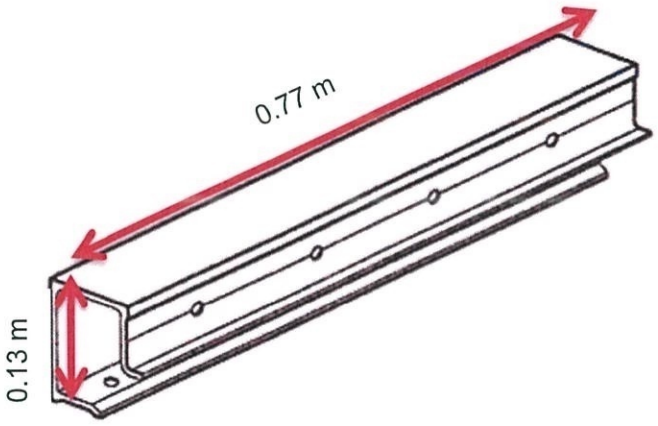


Photo 3.26: Soffit Length

Source: architectjaved.com (n.d)

Photo 3.27: Soffit Length

5) **Deck Beam Bar: -**

It made for the beam and deck. It is use to support the deck and the beam.

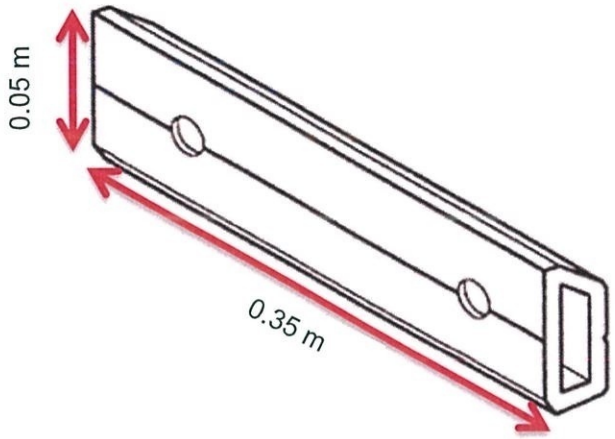


Photo 3.28: Deck Beam Bar

Source: architectjaved.com (n.d)

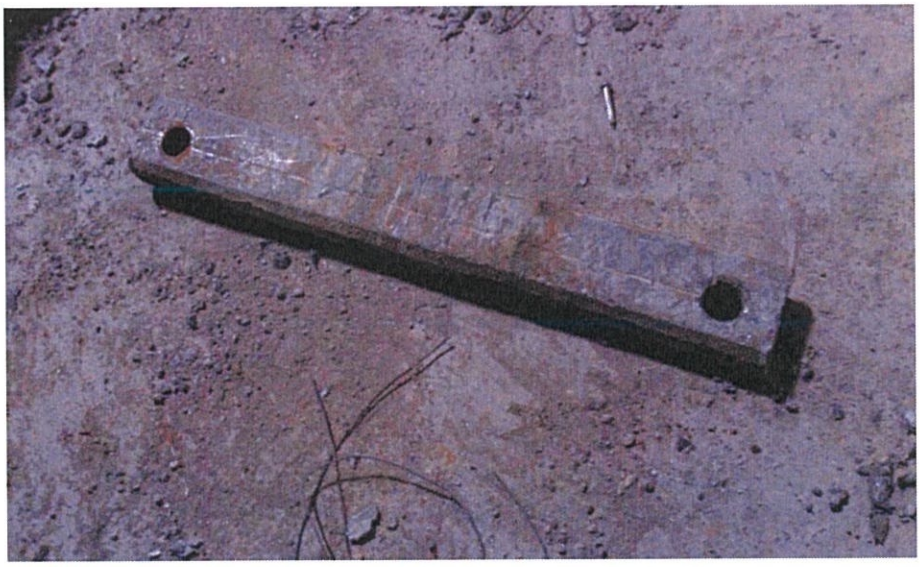


Photo 3.29: Deck Beam Bar

3.3.4.1 Mivan Formwork for Deck Panel

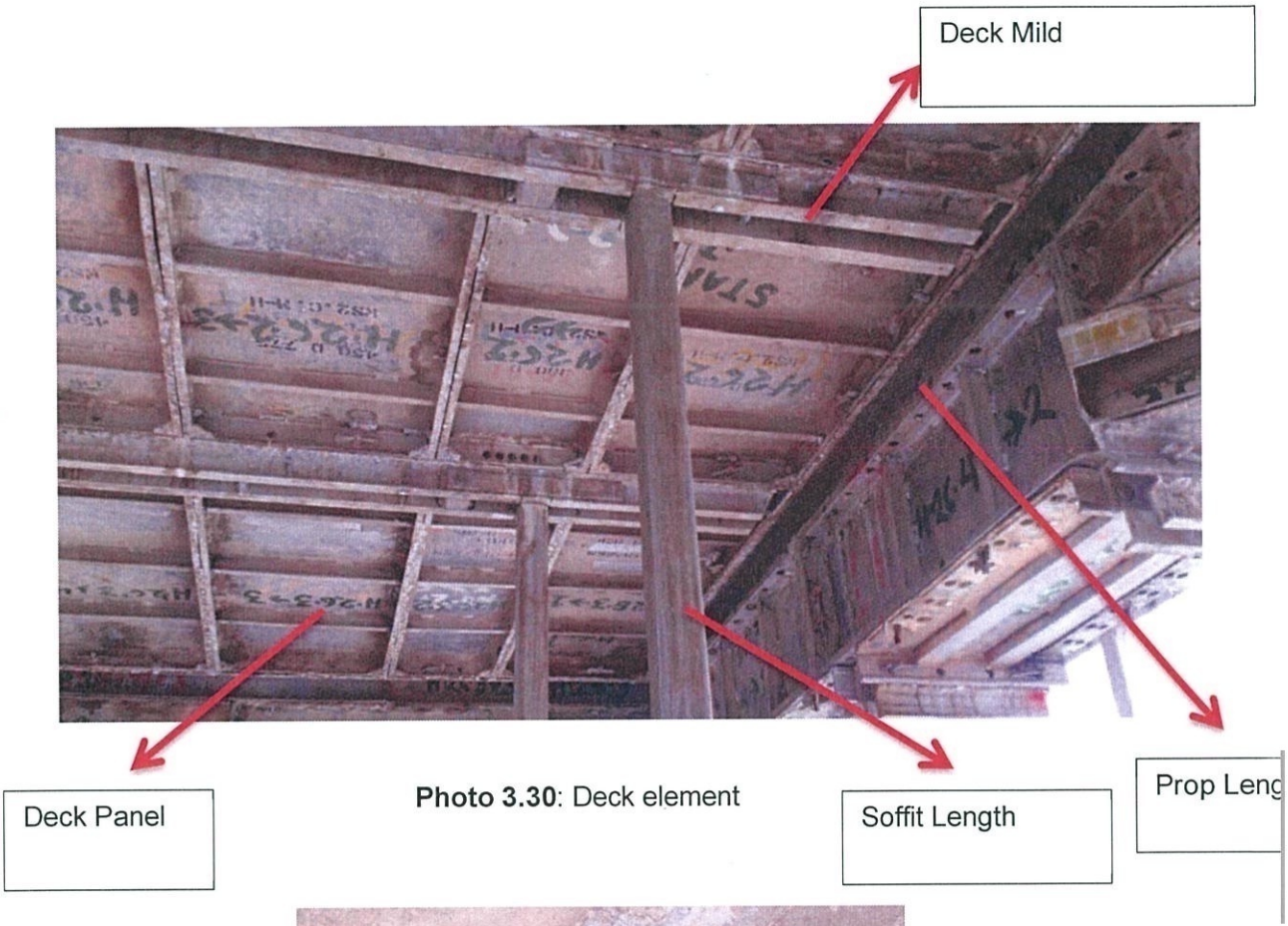


Photo 3.30: Deck element

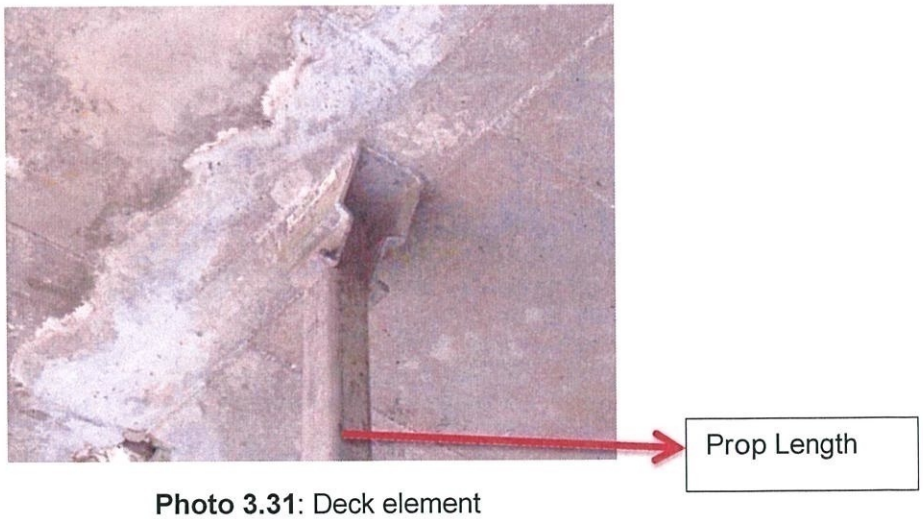


Photo 3.31: Deck element

3.3.4 Other Component

1) **Internal Soffit Corner: -**

It is made for the vertical internal corner between the walls and the beams, slabs, and the horizontal internal cornice between the walls and the beam slabs and the beam soffit. It is use to give more support and prevent tilted.

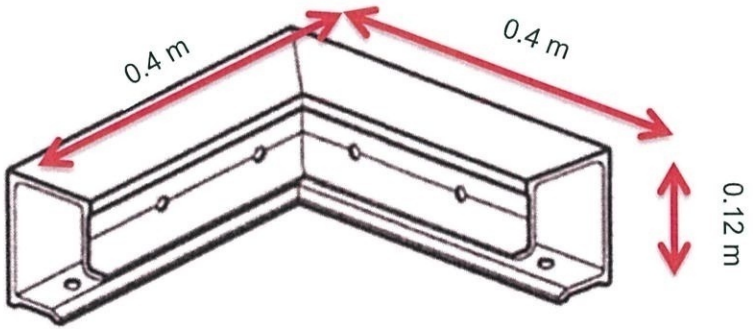


Photo 3.32: Internal Soffit Corner
Source: architectjaved.com (n.d)

Photo 3.33: Internal Soffit Corner

2) External Soffit Corner: -

It is made for the external corner between the components

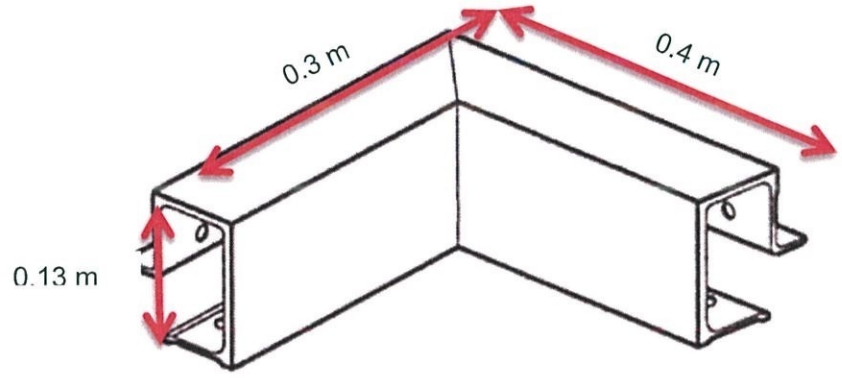


Photo 3.34: External Soffit Corner

Source: architectjaved.com (n.d)

Photo 3.35: External Soffit Corner

3) **Internal Corner: -**
It made for connects two pieces of vertical formwork pieces at their exterior intersections.

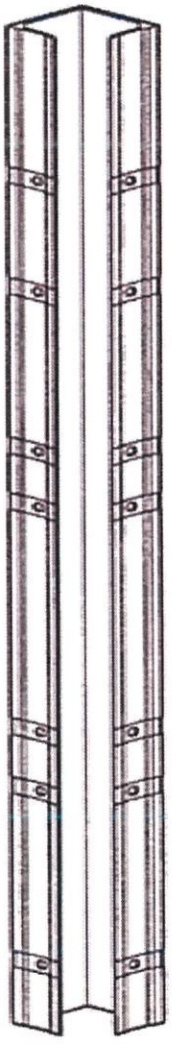


Photo 3.36: Internal Corner
Source: architectjaved.com (n.d)

Photo 3.37: Internal Corner

3.3.6.1 Mivan Formwork for Other Component

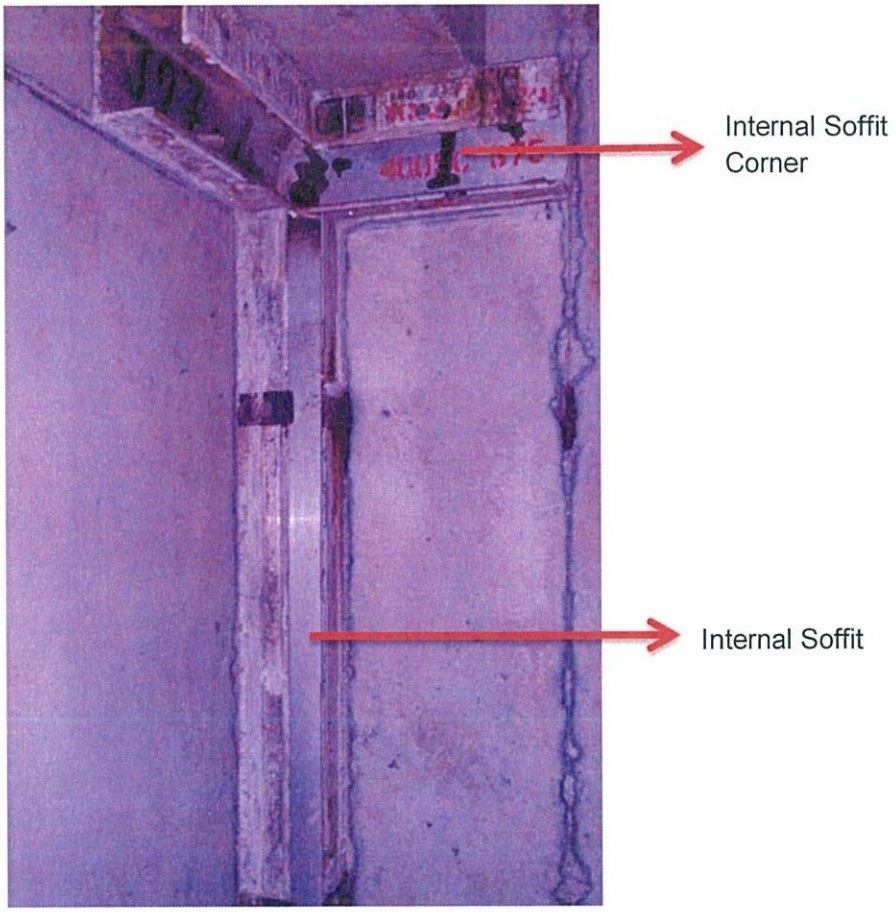


Photo 3.38: Other Component

3.3.7 Method Statement

Method statement is the way of work, procedure, or process of a work. Kindly this method statement can translated either in tabular form or in description. All kind of work from beginning until the end of work being descript here. However, the detail about cost or type of material used is not descripting in detail here.

This method statement, has recorded the main topic of operation carried out with the picture. The total of worker and type of machineries also recoded. However, the completions of work are depending on the number of worker, weather and other factors.

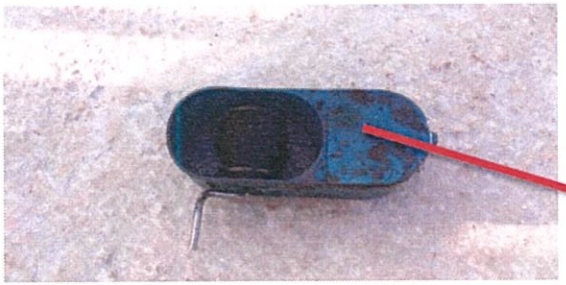
Mivan Formwork has been design with the economical way. It is suitable for high-rise building for reducing cost and time. Mivan has been finish up in the specialist factory, which converts from drawing to reality. Before the formwork delivery to customers, the formwork will label for correct assembly.

The method statement is dividing as pre-concrete activities and post-concrete activities.

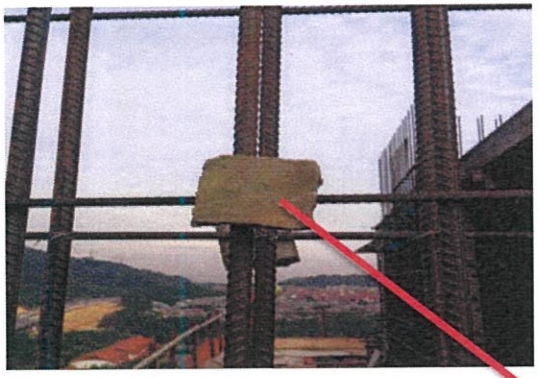
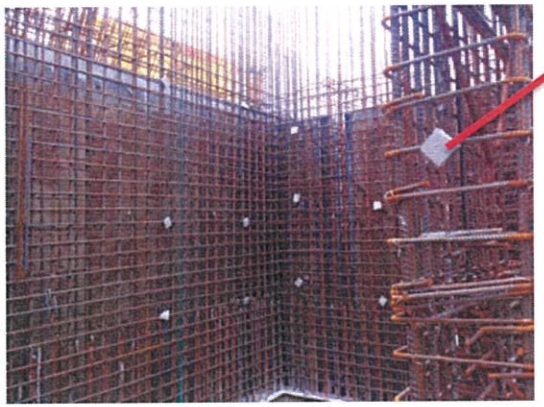
3.3.7 Method statement for installation of Mivan Formwork

Location: Level 7

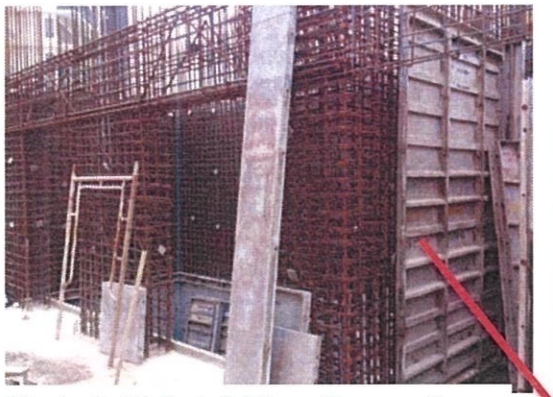
NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
1.	Level Surveys for the new mark.	• After reading dimension in drawing, surveyor need to define the marking point of rising wall at the site.  **Photo 3.39:** level survey  **Photo 3.40:** level survey	• Only two/three surveyor required to get the actual dimension.	• Surveyor tools	• It is importance for new assembly of wall. • It is importance part to make sure the correct dimension are taken. • To make sure the building get the same level for horizontal and vertical .

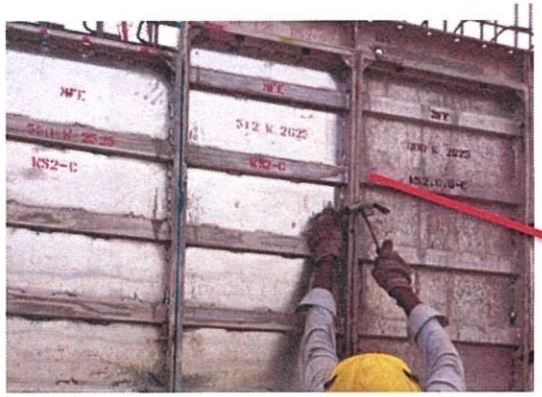
NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
2.	Setting out for wall	• Make a gred line that will give mark of installation of Mivan Formwork.  **Photo 3.41:** Setting out A12  **Photo 3.42**: Setting out	• Only two/three worker required to get the actual dimension. Mattau	• meter tape • Mattau	• It is continuous from past level • It is importance part to make sure the correct dimension achieved. • To make sure the Mivan are install in the correct arrangement.

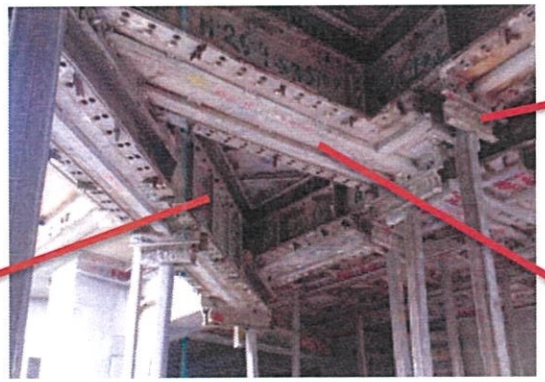
NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
3.	Install RC for wall assembly	• Installation based on drawing • Including types and size of RC  **Photo 3.43**: Install RC grade A8  **Photo 3.44**: Install RC grade A12	• 5 worker required	• Wire • Cutter • Meter tape	• Tight up the RC with wire between the vertical and horizontal. • To easier the concreting work

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
4.	Install spacer block	• Installation spacer block by hanging it to RC.  **Photo 3.45**: Install spacer block  **Photo 3.46**: Install spacer block	• Five workers required	• Wire • Cutter • Meter tape	• It gives space between BRC and Mivan Formwork when installation achieved. • Importance has to avoid BRC to be visible when concreting done and remove the Mivan Formwork.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
5.	Install conduit for electrical wire	• Installation is for electrical use. • The position, size and type are depending on drawing.  **Photo 3.47**: Install conduit  **Photo 3.48**: Install conduit	• Four workers required.	• Wire • Cutter • Meter tape	• Make sure the correct measurement achieved.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
6.	Install wall (0.6m x 2.64m) element of Mivan Formwork	• Hanging up the first surface of formwork on RC surface  **Photo 3.49**: Install Mivan Formwork  **Photo 3.50**: Install Mivan Formwork	• Five worker required Wall plate	• Hammer	• The wall element is place from bottom to the top of the wall. • The arrangement must be following the marking number on the Mivan Formwork.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
		• Then put the other side and claim it with stub pin and tie.  **Photo 3.51**: Install Mivan  **Photo 3.52**: Install Mivan	• 5 worker required Tie Stud Pins	• hammer	• Put the Mivan Formwork side by side following the labelled number. • The claim made to hold the formwork. • While the tie is applied, put the stud pins.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
7.	Install beam component for supporting the upper floor	• Installation is done by arrange the Mivan Formwork permanent.  **Photo 3.53**: Install Mivan for floor  **Photo 3.54**: Install Mivan for floor upper 8th	• 6 worker required	• hammer	• Put the Mivan Formwork permanent side by side following the labelled number. • Beam is the importance part of this building to transfer the life load and dead load to foundation. • Install from the Beam Soffit Bulk Head to the Beam Side Panel. • Continue supported with prop head through prop length.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
8.	Install Mivan Formwork for upper deck.	• Installation is done by arrange the Mivan Formwork permanent.  **Photo 3.55**: Install Mivan for floor  **Photo 3.56**: Install Mivan for floor upper 8th	• 6 worker required Deck Mid Deck Panel Soffit length Prop Length	• hammer	• Put the Mivan Formwork permanent side by side following the labelled number. • Support the deck panel with prop length through deck mid. • The wall is support with kicker and soffit length.

Location: Level 8

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
9.	Level Surveys for the new mark for concreting.	• surveyor need to measure the high of concrete level.  **Photo 3.57:** level survey  **Photo 3.58:** level survey	• Only two/three surveyor required to get the actual high of concrete.	• Surveyor tools	• It is continuos from level 7. • It is importance part to make sure the correct dimension are taken. • To avoid extra concrete.

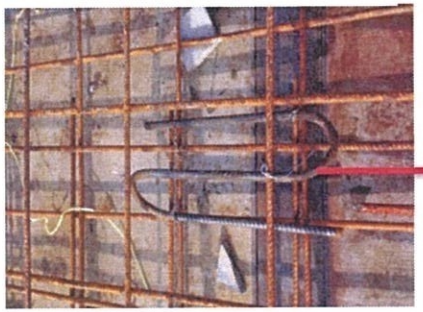
NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
10.	Setting Out.	• Make a gred line that will give mark of installation of BRC.  **Photo 3.59:** setting out	• Only 3 worker required.	• Meter tape	• Make sure the correct measument is acchive. • Importance to avoide mistake while installing. • Will affected the concrete.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
11.	Install the spacer block.	• Put the leveler before BRC  **Photo 3.60:** install the spacer block  **Photo 3.61:** install the spacer block	• Only one worker needed		• It is importance part to make sure the correct level of concret. • To make sure the BRC are not expost when remove the formwork. • The spacer block need to place on the deck surface. • Put it variosly.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
12.	Pour oil	• Pour the hydrolic oil through all the Mivan Formwork  **Photo 3.62:** pour oil	• Only a worker needed.	• Hydrolic oil	• Importance to avoid Mivan stick on concrete. • Easier when remove the Mivan Formwork. • Applying the Hydrolic oil by rolling it with roller.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
13.	Install BRC for deck.	• the brc is install based on drawing. • The size and type of the brc also depend on the drawing.  **Photo 3.63:** install BRC  **Photo 3.64:** install BRC	• Only two/three worker required to get the actual dimension. Size A12	• Meter tape • Cutter • wire	• Make sure the brc are cover all the deck area. • Tight up the BRC with another BRC/RC to get extra strength. • It is also to avoid BRC from move when concreting.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
14.	Install conduit for electrical wire.	• installation of pipe line through the BRC.  **Photo 3.65:** install pipe line  **Photo 3.66:** install pipe line	• Only three worker required for 1 unit of house.	• Meter tape • Saw • Pipe glue	• Install at the middle of BRC. • Make sure the opening of pipe has been close with masking tape. • To avoid the concrete entering the conduit.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
15.	Install second layer of BRC	• put the other BRC at the top of conduit.  **Photo 3.67:** install second BRC  **Photo 3.68:** install second BRC	• Only two/three worker required to get the actual dimension.	• Meter tape • Cutter • wire	• The objective is to give a strong hold to the concrete • Prevent concrete easy to crack • Also put the jumper to avoid BRC to short. • Tight up the BRC to another, to avoid replace when concreting.

3.3.8 Method Statement on Concreting

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
16.	Checking Mivan component and BRC assembly.	• checking type and size of the BRC depend on the drawing • also checking the Mivan assembly  **Photo 3.69:** checking Mivan Formwork and BRC assembly.	• 2 supervisor should be on standby while concreting	• Meter tape	• When the part of mivan is missing or not install righly the concrete will leaking. • Remaks the assembly of BRC to avoid building structure become weak.

NO.	OPERATION	EXPLANATION	WORKER	MATERIAL / MACHINERIES	REMARKS
17.	Pour the concrete grade 40.	pour concrete consistency on the Mivan formwork  **Photo 3.70:** Pour the concrete	• 6 worker needed	• Station pump	• Pour the concrete on the Mivan Formwork surface • Leveling the concrete

NO.	OPERATION	EXPLANATION	WORKER	MATERIAL / MACHINERIES	REMARKS
18.	Compact the concrete	• Vibrate the concrete to level up it through every part of Mivan  **Photo 3.71:** Pour the concrete	• 3 worker needed	• Vibrating poker	• This step is important because to ensure the concrete is compacted and prevent honey comb.

NO.	OPERATION	EXPLAINATION	WORKER	MATERIAL / MACHINERIES	REMARKS
19.	Level up the concrete	• after vibrating concrete, the concrete need to level up • For smooth surface  **Photo 3.72:** Pour the concrete  **Photo 3.73:** Pour the concrete	• 2 worker needed for this	• Conrete leveler	• To give smooth surface • Easier for tile installation

CHAPTER 4

CONCLUSION

4.1 Conclusion

In conclusion, the objective of this study has achieved. Mivan Formwork technology is widely used in construction today. Mivan Formwork has provided many benefits to the user. A lot of knowledge and experience has gained as useful in the future.

Mivan Formwork is importance in forming a new generation of formwork. Mivan Formwork gives the greater advantage than common formwork. That gives the easier way of forming a formwork. The part of the formwork has been design to the real shape of the building. It is just need a little bit assembly and tight with bolt and nuts. After finish up that level, the formwork will remove to upper level to continue the concrete work. Mivan Formwork is lighter than common formwork. Mivan Formwork is made from aluminium that easier to applied than common formwork. In addition it is more durability, and save more cost. This type of formwork can be use more than 250 times, resist corrosion and not decay. It is also easier to make much type of design and shape. It will give the best result of concrete shape than common formwork.

In short, this Mivan Formwork has many advantages compared to common formwork. Therefore, this task has been increasing in the knowledge of the Mivan Formwork is a valuable experience ever in life.

4.3 REFERENCE

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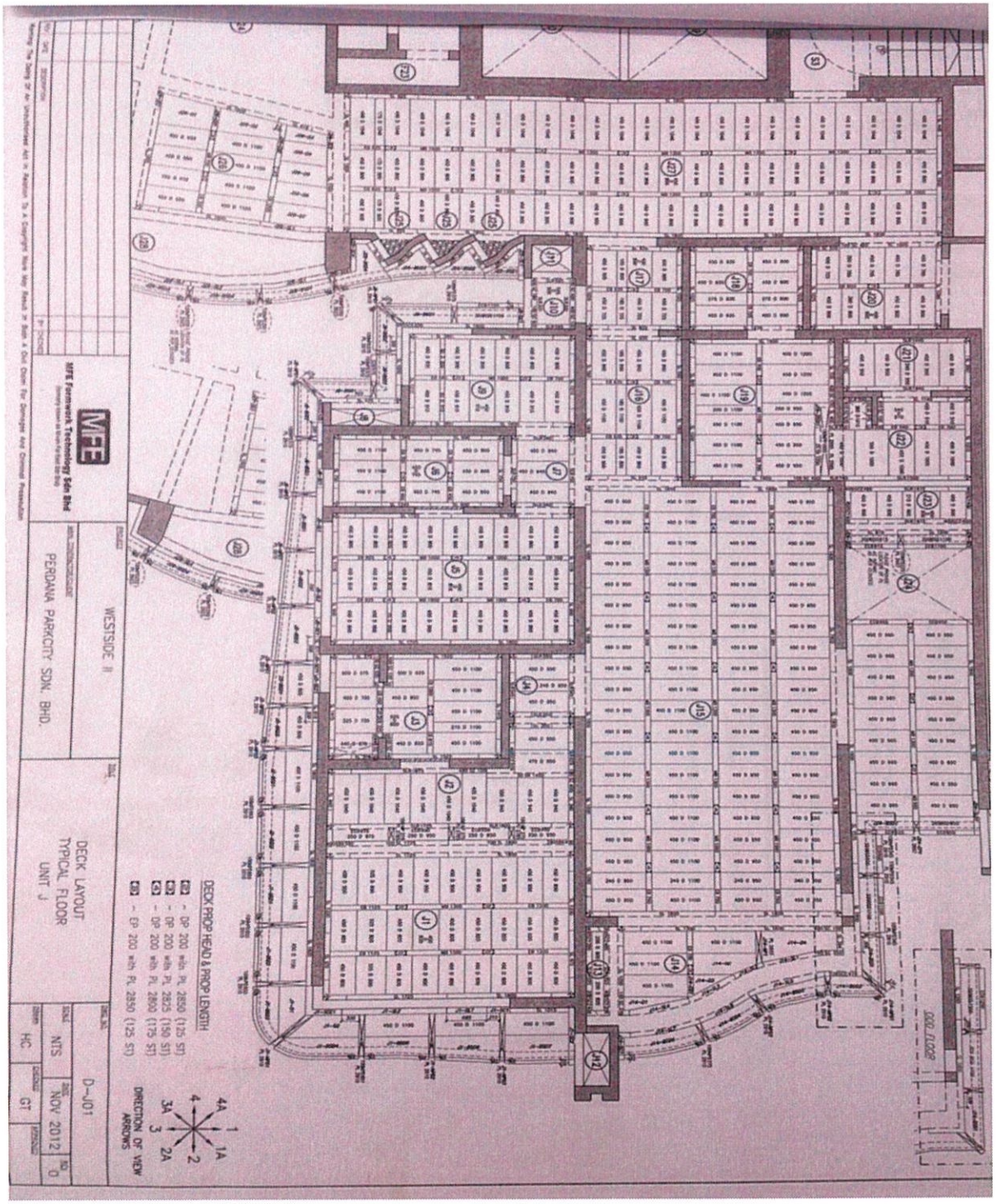
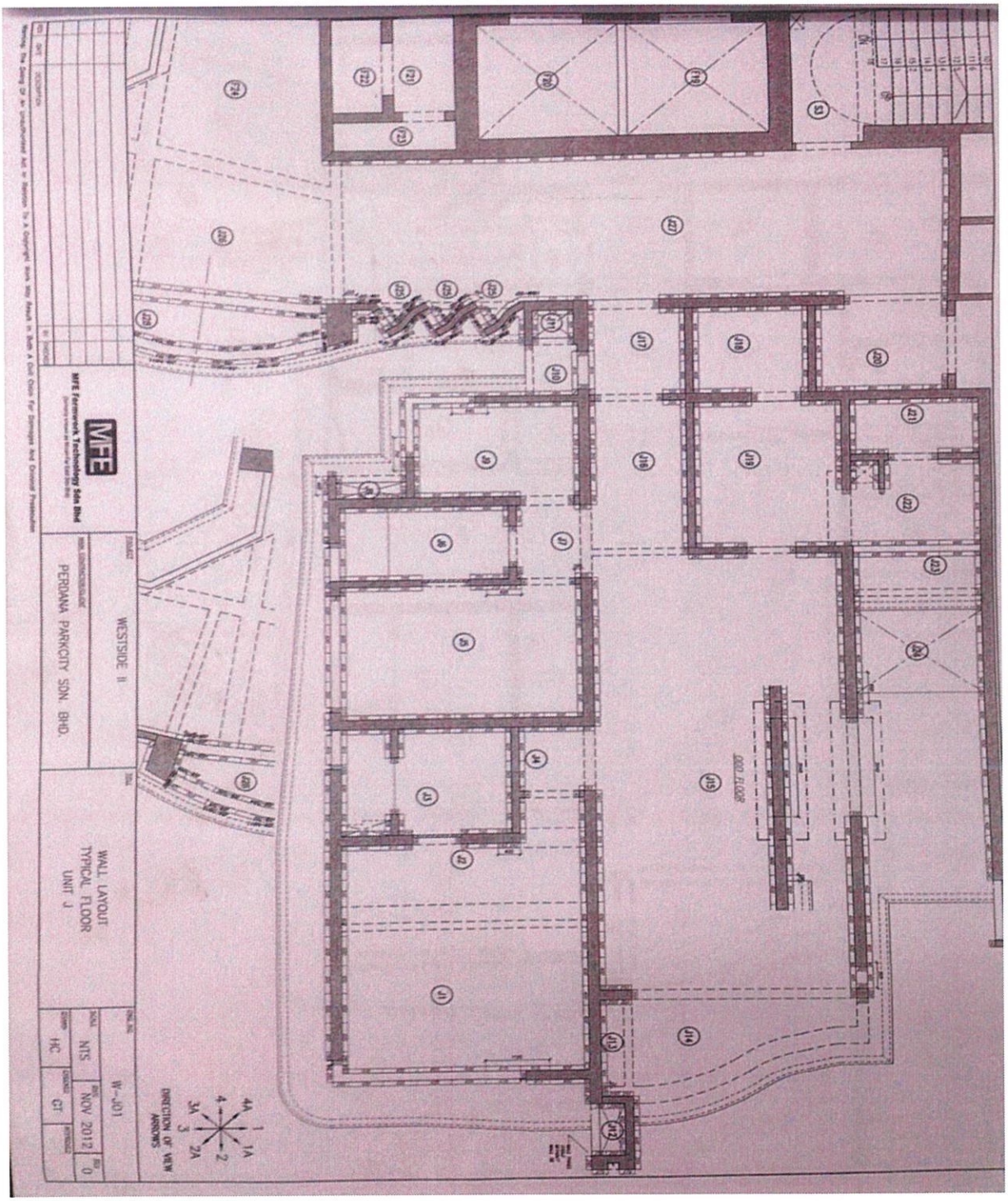
APPENDICES

APPENDIX 1



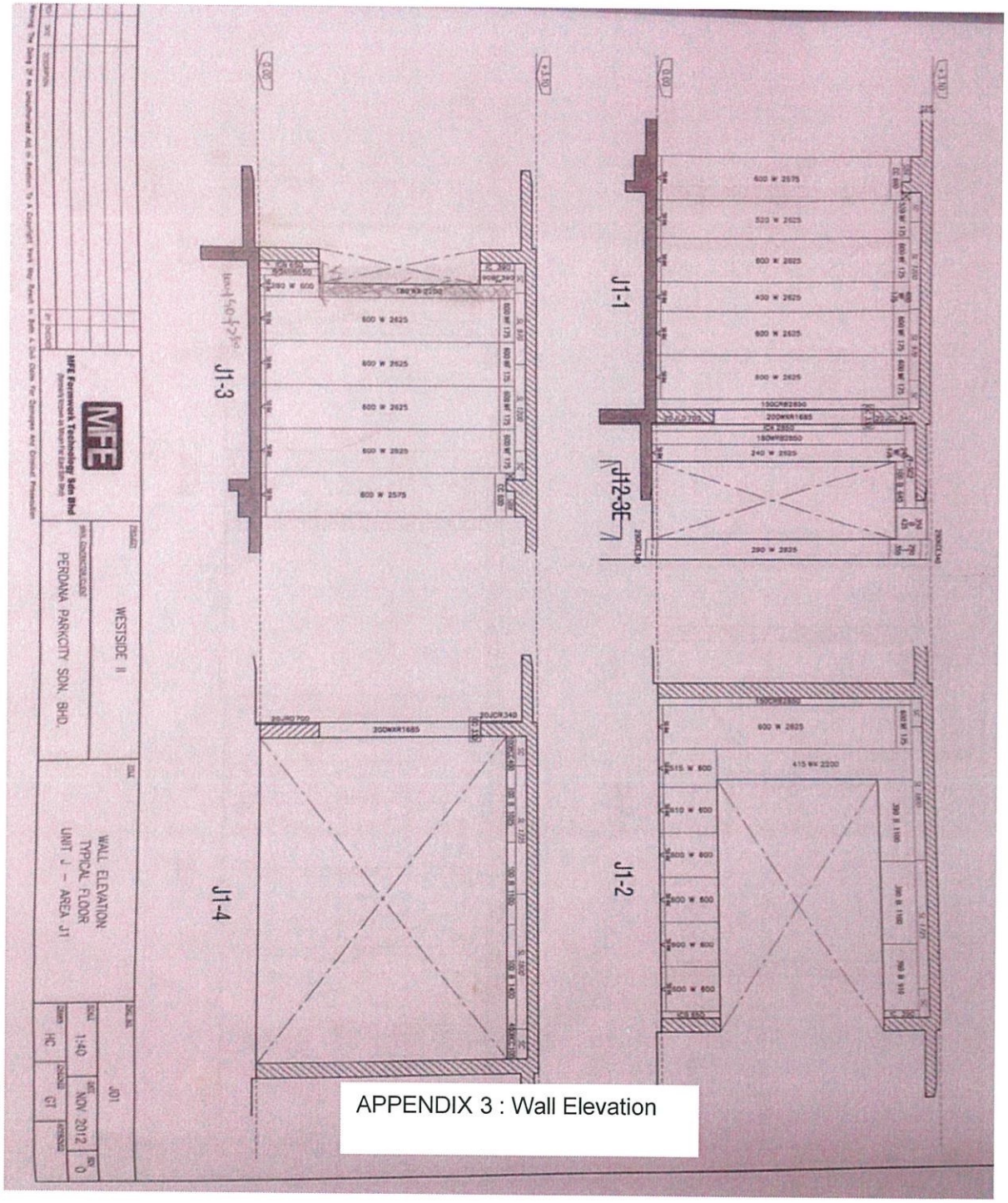
APPENDIX 1 : Deck Layout

APPENDIX 2



APPENDIX 2 : Wall Layout

APPENDIX 3



APPENDIX 3 : Wall Elevation