



**DEPARTMENT OF BUILDING  
UNIVERSITI TEKNOLOGI MARA  
(PERAK)**

**HONEYCOMB DEFECTS WORKS**

**Prepared by:**

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**UNIVERSITI TEKNOLOGI MARA**  
**(PERAK)**

**DECEMBER 2019**

It is recommended that the report of this practical training provided

by

**MUHAMMAD HAFIZ BIN ABDULLAH**  
**2017207006**

entitled

**Honeycomb Defects Works**

be accepted in partial fulfillment of the requirement for obtaining the Diploma In Building.

Report Supervisor : En. Muhammad Naim Bin Mahyuddin.

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**DECEMBER 2019**

**STUDENT'S DECLARATION**

I hereby declare that this report is my own work, except for extract and summaries for which the original references are stated herein, prepared during a practical training session that I underwent at Setiakon Builders Sdn Bhd for a duration of 20 weeks starting from 5 August 2019 and ended on 20 December 2019. It is submitted as one of the prerequisite requirements of BGN310 and accepted as a partial fulfillment of the requirements for obtaining the Diploma in Building.

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UiTM ID No : 2017207006  
Date : 13<sup>th</sup> DECEMBER 201

## ACKNOWLEDGEMENT

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

The internship opportunity I had with Setiakon Builder Sdn. Bhd. Was a great chance for learning and professional development. Therefore, I consider myself as a very lucky individual as I was provided with an opportunity to be a part of it. I am also grateful for having a chance to meet so many wonderful people and professionals who led me through this internship period.

Bearing in mind previous I am using this opportunity to express my deepest gratitude and special thanks to my Snr. Project Manager of this site (Riana Dutamas) who in spite of being extraordinary busy with his duties, took time out to hear, guide and keep me on the correct path and allowing me to carry out my project at their esteemed organization and extending during the training.

I express my deepest thanks to Mr. Huzaifah, Supervisor Civil and Structure for taking part in useful decision and giving necessary advices and guidance and arranged all facilities to make life easier. I choose this moment to acknowledge his contribution gratefully.

It is my radiant sentiment to place on record my best regards, deepest sense of gratitude to Mr. Chai Sin Khooi, Snr. Project Manager, Mr. Huzaifah, Supervisor C&S, Mr. Nuruddin, Supervisor C&S, Ms. Shuhaida, QAQC Engineer, Mr. Jun, Jr. Supervisor Architect and Mr. Fathi, Supervisor M&E for their careful and precious guidance which were extremely valuable for my study both theoretically and practically.

I perceive as this opportunity as a big milestone in my career development. I will strive to use gained skills and acknowledge in the best possible way, and I will continue to work on their improvement, in order to attain desired career objectives. Hope to continue cooperation with all of you in the future.

Last but not least, my special thanks to my Report Supervisor, En. Muhammad Naim Bin Mahyuddin for giving me information that I did not understand during making this report.

Thank you so much.

## **ABSTRACT**

Structure defects is one of the major components of building problems that significantly needed attention. When a building fails to function as it should, we must immediately seek for the determination. Structure defects occurs to either the new building or the old ones. The example of the building defects is defective honeycomb of walls and slab in building. This report was conducted for the defective honeycomb of wall and slab at Level 18 to Level 28 Block B at Riana Dutamas, Segambut, Kuala Lumpur site. The objectives of this report are to identify the type of defective honeycomb of walls and slabs in buildings, to know the exact sequence of work for defective honeycomb and to identify the problem and solution for defective honeycomb of walls and slabs in buildings. This report will look at the sequence of repairing defective honeycomb work based on Method of Statement prepared by Nur Shuhaida, QAQC Engineer, check by Mr. Chai Sin Khooi, Snr. Project Manager and approved by Structure Consultant from Jacobs Engineering Group Malaysia Sdn. Bhd. For the conclusion, after finish repair the defects and know the problems, it will not effects the finishes works, hollow and licking at opening area.

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## CHAPTER 1.0

### INTRODUCTION

#### 1.1 Background and Scope of Study

First of all, the case study is carry out at 368, Riana Dutamas, Segambut. It is located at Jalan Segambut, Segambut, 51200 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur. This project consists 2 Block Building of a 37-Storey Service Apartment (1018 Units) which contains, Phase 1A, Block A (509 Units) 32-Storey at Level 5 To 36, 1-Storey Residents' Convenience at Level 5, 1-Storey Mezzanine at Podium and 5-Storey Carpark at Ground floor to Level 4. Phase 1B, Block B (509 Units) 32-Storey at Level 5 to 36.



**Figure 1:** Location of the construction site

(Source: Google Map)

This report mostly focus on honeycomb defect work on wall, floor slab and soffit slab. Which is the sequence of work for defective honeycomb. The sequence is know the type of honeycomb, use Sika215 or the same grade of designed concrete and inspection the hacking.

## 1.2 Objectives

- To identify the type of defect honeycomb of walls and slabs in buildings.
- To know the identify sequence of work for defect honeycomb.
- To identify the problem and solution for defect honeycomb of walls and slabs in buildings.

### 1.2.1 Methodology

#### 1. Interview

Interview the QAQC Engineer, Cik Shuhaida in Riana Dutamas site. Ask about the NCR which is the defective of honeycomb cases. All the information has been noted. Other than that, I also interview the (IOW) and supervisor at this site about this NCR (defective honeycomb case).

#### 2. Observation

Observation on the inspection method. The inspection is doing by the QAQC engineer and (IOW). They inspect the hacking progress which is the concrete still loose or the firm surface is reach. If passes it will continue to the next step.

#### 3. Research

Doing the research on the document have been gave by the QAQC engineers at this site. Also do the research on internet to get more information and double confirm the information.

## CHAPTER 2.0

### COMPANY BACKGROUND

#### 2.1 Introduction of Company

Incorporated on 12th December 1994, Setiakon Builders Sdn Bhd started off as a sub-contractor, focusing mainly on building and infrastructure works 20 years ago. Some of the notable projects completed were Putrajaya's Dataran Putra, Customs, Immigration & Quarantine Complex at Tanjung Kupang Johor and Kuala Lumpur Flood Mitigation.

From the beginning, Setiakon has grown and become a main contractor completing residential projects in Klang Valley and Johor such as Tropez Residence at Johor, 28 Dutamas at Kuala Lumpur, Mirage By The Lake at Cyberjaya, Tropicana Gardens at Selangor and Mirage Residence at Kuala Lumpur. The latest string of projects that Setiakon has secured over the last few years are located in Klang Valley such as D'sara Sentral at Selangor, Lumi Tropicana Residences at Selangor, Skyluxe on the Park at Kuala Lumpur, Arte+ Jalan Ampang at Kuala Lumpur and lastly Tropicana Metropark Paloma at Selangor.



As other company, Setiakon Builders Sdn. Bhd. has their own vision, mission, and objectives. For vision, Setiakon Builders aim to be one of the most distinguished building solution providers in Malaysia and the region. Then, for mission, they aim to build quality, efficient and conducive environment that fulfils people's dreams, aspirations and vision for a better world. Lastly, for their objectives, they aim to ensure customers satisfactions by delivering construction work of the highest standard in a cost-effective and timely manner. Then, they aim to deliver quality and productivity by consistently their capabilities and professionalism. Lastly, they aim to provide forward-looking construction solutions to meet their client's requirement and needs.

In a nutshell, in 2004, Setiakon Builders Sdn Bhd was succeed to build the road toward the global arena by securing contracts in Dubai and UAE with the successful completion of the projects.

## **2.2 Company Profile**

Setiakon Builders Sdn. Bhd. strives to consistently ensure the projects are successfully delivered on time, within the budget and not compromising on the quality. Objectives of the company are to ensure customer satisfactions by delivering construction work of the highest standard in a cost-effective and timely manner. Other than that, to deliver quality and productivity by consistently raising their capabilities and professionalism. Their last objective is to provide forward-looking construction solutions to meet their client's requirement and needs.

**Table 1: Company's Profile**

Title	Description
Name of company	Setiakon Builders Sdn. Bhd.
HQ Address	13, jalan cempaka SD 12/1, Bandar Sri Damansara, 52200, Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur.
Board of Director	 <ul style="list-style-type: none"> <li>• Dato' Kuan Ah Hok - Managing Director</li> </ul>  <ul style="list-style-type: none"> <li>• Tan Tong Kwee – Executive Director</li> </ul>
Incorporation Date	12 December 1994
Grade CIDB	<ul style="list-style-type: none"> <li>• G7 – B(Building)</li> <li>• G7 – CE (Civil Engineering)</li> <li>• G7 – ME (Mechanical and Electrical Engineering)</li> </ul>
Website	<a href="http://easytest.my/setiakon/">http://easytest.my/setiakon/</a>
Fax	
Email	<a href="mailto:info@setiakon.com.my">info@setiakon.com.my</a>
Company Number	

## 2.3 Organization Chart

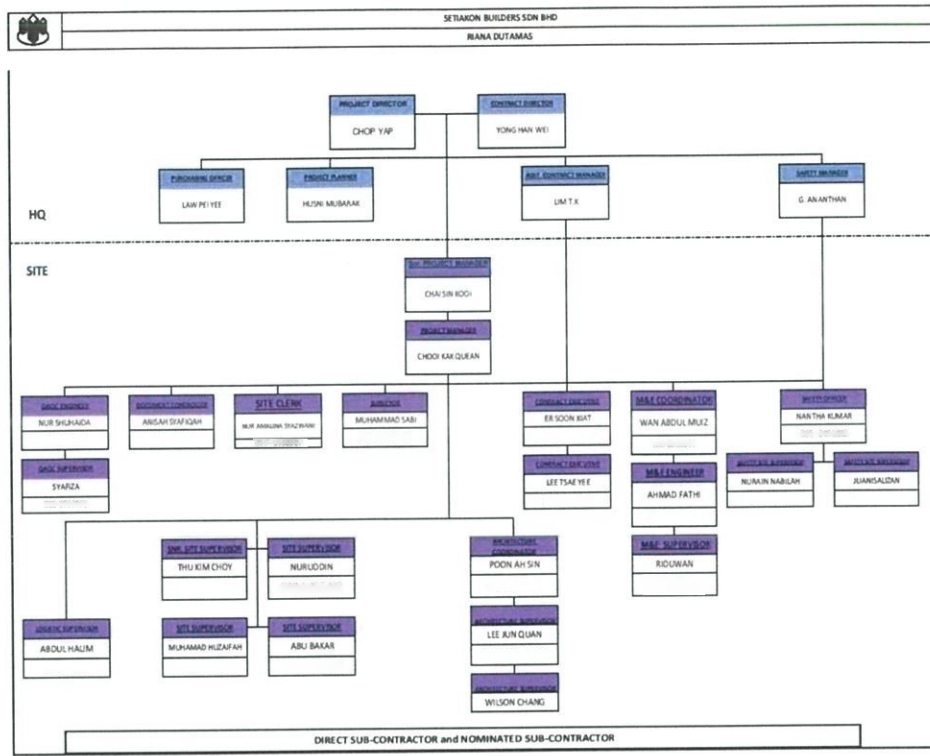


Figure 2: Organization chart

## 2.4 List of Project

### 2.4.1 Completed Projects

Project Name	Project Title	Project Value
Arte+ Ampang, Kuala Lumpur	<p>Proposed Commercial Building Contains:</p> <p>Tower A (Office Tower)</p> <ul style="list-style-type: none"> <li>A. 1 Level Mechanical Space and Toilet at Basement Floor.</li> <li>B. 1 Level Main Lobby and Banquet Hall Downstairs.</li> <li>C. 1 Level VIP Waiting Space and Cafeteria at 1<sup>st</sup> Floor.</li> <li>D. 6 Levels Podiums Carpark.</li> <li>E. 1 Level Sport and Recreation at 8 And 16 Floor.</li> <li>F. 1 Level Mechanical Space at 28<sup>th</sup> Floor.</li> </ul> <p>Tower B (Office Building)</p> <ul style="list-style-type: none"> <li>A. Block 1, 44 Levels Office Buildings Together with ‘Sky Garden’ At Floor 43.</li> <li>B. Block 2, 50 Levels Office Buildings Together with ‘Sky Garden’ At Floor 51.</li> <li>C. Block 3, 38 Levels Office Buildings Together with ‘Sky Garden’ At Floor 25.</li> </ul> <p>Client: Nusmetro Ampang Sdn. Bhd. Consultant: Aeon Arkitek</p>	RM 277,500,000.00
Atria Damansara, Petaling Jaya, Selangor.	<p>Redevelopment Proposals from 1 Block of Commercial Building 4 Levels and Commercial 3 Levels to 2 Office Tower Blocks 16 Level Upstairs 4 Shopping Center Podiums with 2 Ground Floor Levels and 4 Levels Car Parking Levels Top PT9090, PT10166, PT10197, and PT10198, Jalan SS22/43, SS22, Sungai Buloh District, Petaling District, Selangor Darul Ehsan for Messrs. Atria Damansara Sdn. Bhd.</p> <p>Client: Atria Damansara Sdn. Bhd. Consultant: Arkitek Akiprima Sdn. Bhd.</p>	RM 72,343,325.89

**Table 2:** Completed project list

## 2.4.2 Project in Progress

Project Name	Project Title	Project Value
Riana Dutamas, Segambut.	<p>Proposed a 2 Block Building of a 37-Storey Service Apartment (1018 Units) which contains:</p> <p>Phase 1A</p> <ul style="list-style-type: none"> <li>I) Block A (509 Units) 32-Storey at Level 5 To 36.</li> <li>II) 1-Storey Residents' Convenience at Level 5.</li> <li>III) 1-Storey Mezzanine at Podium.</li> <li>IV) 5-Storey Carpark at Groundfloor to Level 4.</li> </ul> <p>PHASE 1B</p> <ul style="list-style-type: none"> <li>I) Block B (509 Units) 32-Storey at Level 5 to 36.</li> </ul> <p>Client: 368 Segambut Sdn. Bhd.</p>	RM 188,000,000.00
Pedoman Cluster C, Bukit Bintang.	<p>Proposed a 1 Block of Office Building 48-Storey which contains:</p> <ul style="list-style-type: none"> <li>I) 1-Storey Lobby Lounge Podium, Trading Room (Level 1) and Management Office Space (Mezzanine Level).</li> <li>II) 1-Storey Trading Room and M&amp;E Room (Level 2).</li> <li>III) 8-Storey Podium Carpark (Level 3 to Level 10).</li> <li>IV) 1-Storey Restaurant Space (Level 11).</li> <li>V) 3-Storey Personal Club (Level 12 to 14).</li> <li>VI) 33-Storey Office Space (Level 15 to 47)</li> <li>VII) 1-Storey Basement Carpark.</li> </ul> <p>Client: Pedoman Cekap Sdn. Bhd.</p>	RM 168,800,000.00

**Table 3:** Project in progress list



## CHAPTER 3.0

### CASE STUDY

#### 3.1 Introduction to Case Study

The project that doing for my practical training was Proposed a 2 Block Building of a 37-Storey Service Apartment (1018 Units) which is contains 2 phase.

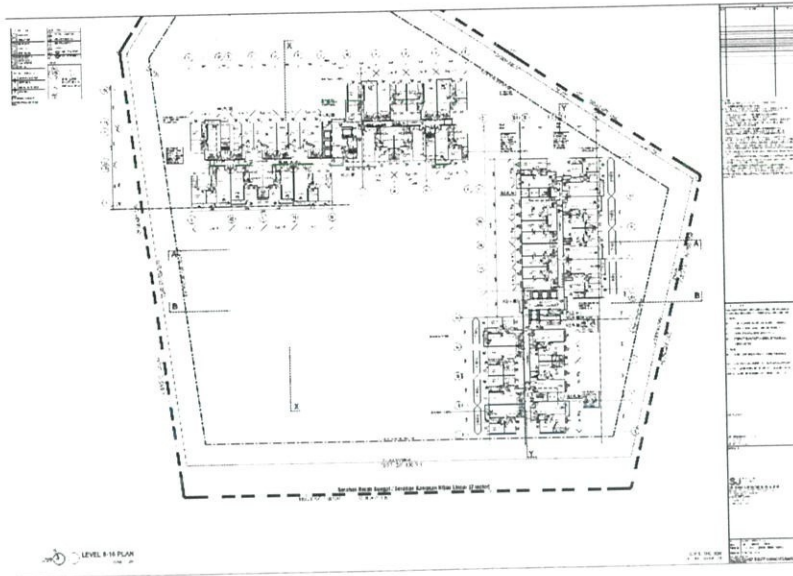
Phase 1A: Block A (509 Units) 32-Storey at Level 5 To 36, 1-Storey Residents' Convenience at Level 5, 1-Storey Mezzanine at Podium and 5-Storey Carpark at Ground floor to Level 4.

Phase 1B: Block B (509 Units) 32-Storey at Level 5 to 36.

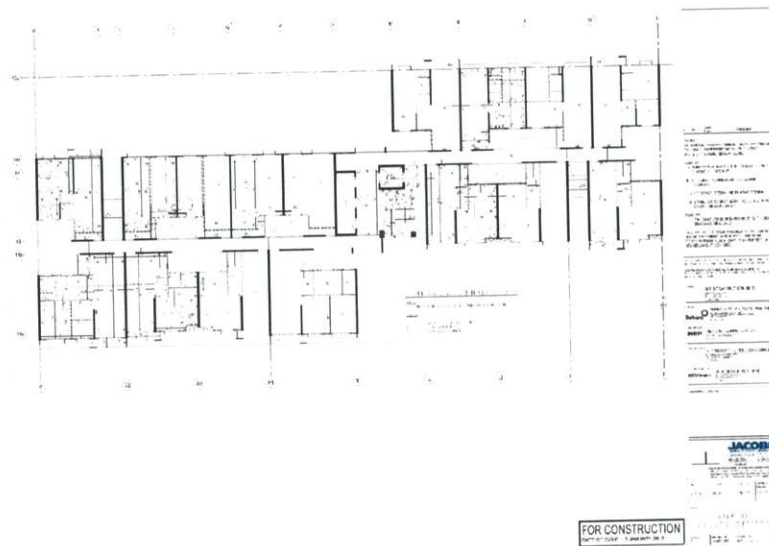
The total cost for this project is RM 188,000,000.00. This project was start on 18<sup>th</sup> March 2018 and target to be done by 30<sup>th</sup> June 2020.



**Figure 3:** View of the progress building the left is Tower A, then Tower B.



**Figure 4:** Key plan for Level 8-16 plan.



**Figure 5:** Key plan for Level 5 slab reinforcement.

The location of this project is near the Stesen Keretapi Segambut and Petronas Station Segambut. I mostly focus on defect activities in building. The types of defects that i learn is honeycomd defects works.

### 3.2 Type of defective honeycomb of walls and slabs.

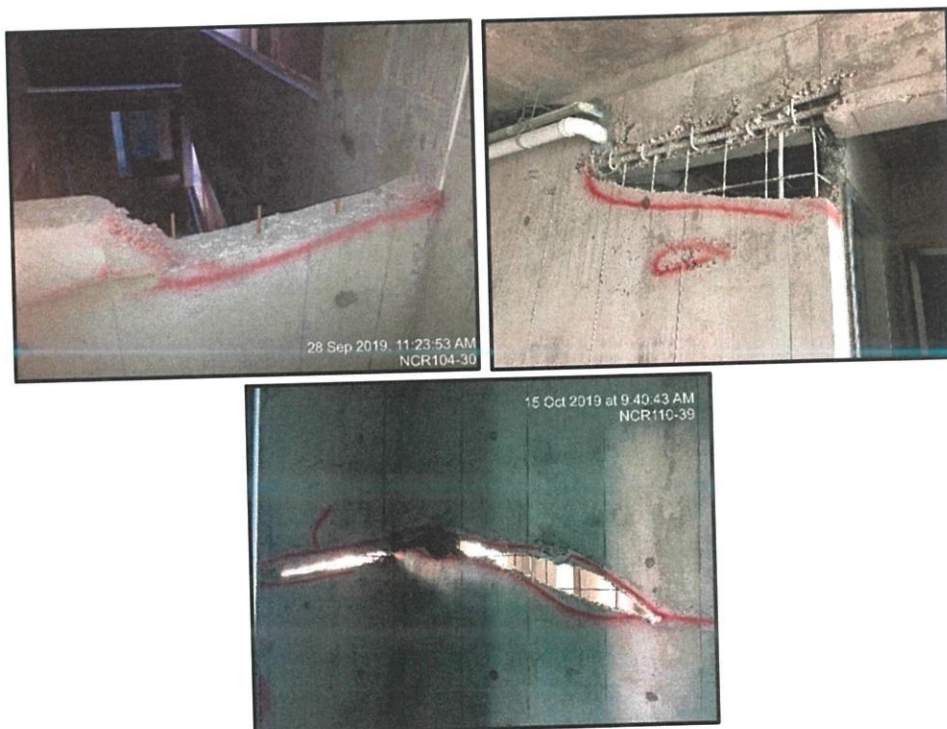
Honeycombs are hollow spaces and cavities left in concrete mass on the surface or inside the mass where concrete could not reach. These look like honey bees nest. Improper vibration and workability of concrete are main causes of honeycombs in concrete.

Honeycombs which are on sides are visible to naked eyes and can be detected easily as soon shuttering is removed. Honeycombs which are inside mass of concrete can only be detected by advanced techniques like ultrasonic testing etc.

There are two type of defective works and repair material will depend on the type of repair needed:

#### I. Major defective honeycomb

Using same grade of design concrete by properly vibration to achieve monolithical structure.



**Figure 6:** Example of major defective honeycomb

## II. Minor defective honeycomb

Structure repair >10mm deep using SIKA215 non-shrink grout (cementitious repair compound).



Figure 7: Example of minor defective honeycomb

### 3.3 Sequence of work for defective honeycomb.

- **Major Defective Honeycomb**

- i. All the loose parties at the honeycomb defective area will be hacked off until the firm surface reach.



**Figure 8:** Hacking work



**Figure 9:** Hacking surface that reach firm surface

- ii. After minor hacking work is done the defective area and reinforcement bar exposed will be clean before the rectification work commence.



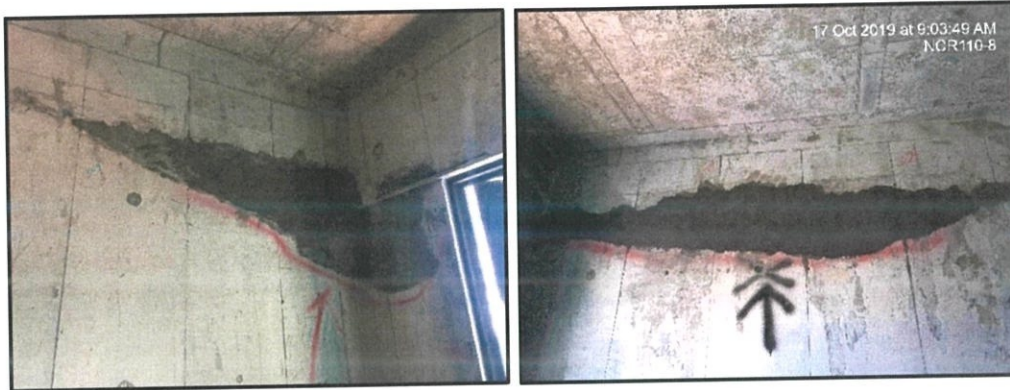
**Figure 10:** Clear debris and dust

- iii. Supervision officer (IOW) inspection will be carry out after the hacking and cleaning work is done.



**Figure 11:** Inspection with (IOW)

- iv. When the inspection complete, same grade of concrete to be pour at defective area. SIKA215 non shrink will be used on the infill material for small quantity and small area.



**Figure 12:** Complete honeycomb defect repaired

- **Minor Defective Honeycomb**

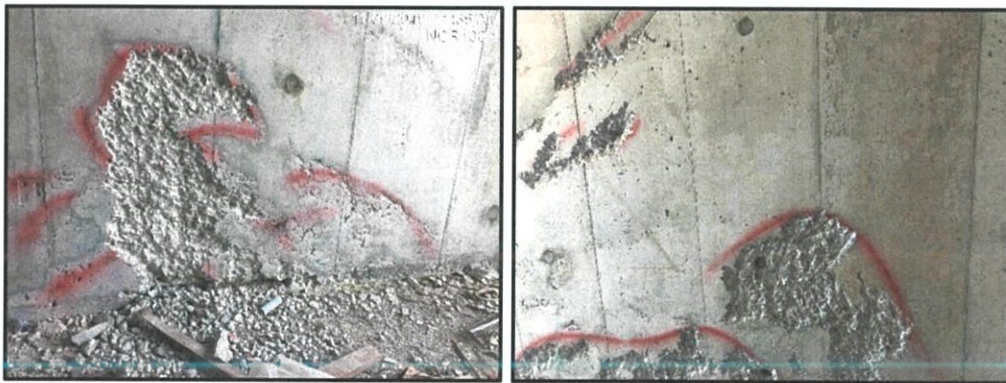
All honeycomb, loose, cracked or friable concrete, oil, grease, plaster, dust, debris and others. In this area shall be removed until sound concrete is reached. Where breaking out is not required, roughen the surface and remove any laitance by light girtblasting.

In any case where the steel reinforcement is exposed, remove all the loose scale and corrosion deposit. Steel should be clean to a bright condition paying particular attention to the back exposed steel bars.

The equipment and method to break out the concrete shall be such that no reinforcing steel or other embedded items such as conduit or lifting sockets and others are loose or damaged unless directed by the Resident Engineer.



- i. If the honeycomb occurs in a big area underneath the structure member with congested steel reinforcement, where the void may occur during the repair process, pressure grout shall be used. The prepared void shall be profiled so that entrapment of air during the repair process can be avoided. The minimum depth of repair shall be profiled so that entrapment of air during the repair process can be avoided. The minimum depth of repair shall be 40mm throughout. For the pressure grout, the entry point of the feed pipe into the form shall be at the lowest point of void. Sufficient hydrostatic head or pumping pressure shall be maintained to ensure that the void is filled completely and no air entrapment occurs. Where necessary, provision shall be made for bleed or exit points to prevent air entrapment and enable the extent of flow of the concrete grout to be assessed.



**Figure 13:** Example of minor defective honeycomb

- ii. If the honeycomb occurs in a big area with open access, pouring cementitious grout by using SIKA215 non shrink shall be placed. For thicker section it is necessary to fill out SIKA215 will graded to minimize heat build up.

Before apply concrete grout or repair compound, the prepare surface shall be saturated thoroughly with clean water but free of any surface water of puddles.



**Figure 14:** Example honeycomb that have been complete patching



**Figure 15:** SIKA215

- iii. If the honeycomb occurs in a small area, the materials shall be applied by gloved hand or trowel to be prepared and primed surface of the substrates and will be well worked in, paying particular attention to packing behind and between the reinforcement. Particular care shall be taken in application of the repair materials. Where necessary, it should be built up in successive wet on wet layer to the required profile.

If sagging occurred, the materials shall be completely removed and the void filled in two or more successive application or by the use of formwork in accordance with the manufacturer's recommendations. After applying sufficient mortar to build the surface to the require level or to achieve the require cover to the reinforcement, the surface shall be troweled smooth to the finished profiles.



**Figure 16:** Trowel



**Figure 17:** Glove

### 3.4 Problem and solution for defective honeycomb of walls and slabs.

- **Problems of defective honeycomb.**

Honeycomb is due to non-reaching of concrete to all places due to which cavities and hollow pockets are created, main reasons are:

- i. Improper vibration during concrete.
- ii. Less cover to reinforcement bars.
- iii. Use of very stiff concrete (this can be avoided by controlling water as per slump test).
- iv. Places like junction of beam to beam to column and to one or more beams are the typical spots where honeycombs are observed. This is due to jumbling of reinforcement of beams and column rods at one place; special attention is required at such place during concreting and vibrating.
- v. Presence of more percentage of bigger size of aggregate in concrete also prevents concrete to fill narrow spaces between the reinforcement rods.

- **Solution for defective honeycomb problems.**

Strictly speaking wherever honeycombs are observed in concrete, the affected area should be broken and the portion should be re-concreted after applying grouting chemical to the old surface.

Honeycombs as a defect not only reduces the load bearing capacity but water finds an easy way to reinforcement rods and rusting and corrosion starts. Corrosion is a process which continues through reinforcement rods even in good concrete, this result in losing grip between rods and concrete, which is very dangerous to safety and life of concrete structures.

Reinforced concrete structures have failed within 20 or 30 years of their construction due to honeycombs, which is less than half their projected life. Especially no risk should be taken in case of columns, machine foundations, rafts, beams etc., where breaking and recasting is the only best way.

In case of honeycombs on surface pressure grouting with cement based chemical which are non-shrinkable can be adopted after taking opinion of the designer and acting as per his advice. It will not be out of context to point out that contractors and their supervisors are in the habit of hiding honeycombs by applying super facially cement plaster on the honeycombs, hence site engineer must be very cautious.

At places of junction of columns and beams concrete with strictly 20mm and down aggregates should be used with slightly more water and cement to avoid honeycombs. Tap with wooden hammer the sides of shuttering from outside during concreting and vibrating will help minimizing honeycombs to a great extent in case of columns and beams. Use of thinner needle say 25mm or less with vibrator at intricate places of concreting will also help in reducing honeycombs.

## CHAPTER 4.0

### CONCLUSION

#### 4.1 Conclusion

As a conclusion, repairing the honeycomb defect is important because it is one of the major components of building problems that significantly needed attention. When a building fails to function as it should, must immediately seek for the determination. Structure defects occurs to either the new building or the old ones. This defect must repair because it can prevent many bad affects if this defect has not been repaired. Example of the affect that can prevent is hollow when skim coat has been done, licking at opening like window, wall easy to crack and others.

For this report, have 3 thing that have been more focus which is the first one is type of defective honeycomb of walls and slabs. This objective focus on how to know the type of honeycomb defect on concrete which is have 2 type (minor and major). Next, the sequence of work for defective honeycomb. This objective will explain the sequence of work for both of the type of honeycomb defect which is minor and major defective. The last one is problem and solution for defective honeycomb of walls and slabs, it will tell what problem that can make the honeycomb arise and the ways or solution to prevent the honeycomb defect.

Lastly, the aim of the report has been achieved because all the objective that mention in this report I have learn at this site smoothly.

## REFERENCES

### Document:

Nur Shuhaida, 2018, Honeycomb Rectification Works, Ref: SB1801/368RD/WMS/C&S/002

### Web Site:

Setiakon Builders Sdn Bhd Details. Available from: <http://easytest.my/setiakon/about-us/>

Location of Riana Dutamas Site. Available from:

<https://www.google.com/maps/place/Riana+Dutamas/@3.1856239,101.6684834,15z/data=!4m5!3m4!1s0x0:0x5afed7f84024b929!8m2!3d3.1856239!4d101.6684834>