



DEPARTMENT OF BUILDING
UNIVERSITI TEKNOLOGI MARA
(PERAK)

DEFECT LIST AT SEMI-D HOUSING PROJECT

Prepared by:

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

DECEMBER 2019

It is recommended that this practical training report provided

by

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entitled

Defect List at Semi-D Housing Project

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

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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 Hijauan Damai 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 fulfil of the requirements for obtaining the Diploma in Building.

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Thank you so much.

ABSTRACT

As the modern society continued to strived, day by day a piece of land is contributed with the purpose of building construction. Looking it in positive perspective it could boost the society to move forward in a faster pace but the one thing that society is forgetting is that they tend to focus more on the quantities of the building rather than its quality. This is due to the human nature to be clouded with greed. Thus, making the building more vulnerable to defect. The aim of this investigation is to focus on the defect that had or can occurred in a Semi-Detach building. A thorough inspection and investigation had been carried out to identified those defects with a better understanding about the topic so that countermeasure can be took effectively. In conclusion, to better understand the defect an individual must know why the defect had occurred in the first place so that in the near future it will exist a building that is free from any type of defect throughout its lifespan.

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CHAPTER 1.0

INTRODUCTION.

According to Webster's Dictionary, "Building defect is meant by missing of something important to achieve perfectness or in other words, shortcoming" (Ahzahar et al., 2011). Moreover, defects also defined as "improper condition that may cause impact to the building structure, leading to low quality and performance of the building" (Burden, 2004). "Defect that occurred will not only cause aesthetic problems but will also affect the safety of the users" (Che-Ani et al., 2011).

Why defect had to be tackled or action has to be taken if found? To put it simply, there's nothing good coming from a defect in building. Every safety measured had to be taken in the construction to keep the number of accident and the defect to the very minimum. The defect will exist no matter what, the only question is "does the defect expected to exist?". Since we can't actually see the defect if it happens underneath structure or even on the foundation. A building defect also is a violation of the applicable building code and violation of standard of care in community in which the project is located or violation of manufacturer's recommendations (Robert, 2007).

Defect can be break down into two term, Structural Defect and Non-Structural Defect. A structural defect is defined as the actual physical damage that occur to the building making it unsuitable and hazardous to the occupant if it is still operating on a regular basis. For example, damages have been found at the designated loadbearing elements of a building which affects their load-bearing functions.

Meanwhile as for Non-Structural Defect, it is actually quite frankly the opposite of structural defect. Non-Structural Defect is an imperfection that is found in non-structural component. For Example, imperfection in the mortar work, finishes, component fixture and etc. one of the reasons for its existence is cause by incompetent worker.

Identifying defect at its early stage comes with number of benefits as it can and will prevent further damages to the structure or it can even to prevent the structure to collapse due to the defect. It is also giving the Project Manager time to form a plan to comprehend the situation at hand. All these causes will eventually reduce the value of the buildings and the cost of rectifying it will be expensive if the defects are being neglected by the peoples who is involved (Anthony, 2013). Even though there are two term of defect, however the aim and main focus of this study is to identify the Non-Structural Defect on a building during its construction.

1.1 Objectives

- To identify the defect and possible causes of building defect.
- To inspect thoroughly the state of the building structure.
- To determine the solution for the building defect.

1.2 Scope of Study

The defects of a residential houses are the scope study and is carried out at Jalan Tarmizi, Mukim Kapar, Daerah Klang, Selangor Darul Ehsan which include 6 unit of residential houses. The case study was mainly focus on the defect that can be found in Semi-D housing. In addition. it also includes the problem & solution for the existence of the defect including the method and the materials. However, the case study does not include the quantities of labours, safety and health information and types of utilities. The method that is used is by doing regular inspection on the premises and labelling the defect when it is found. The procedure was carried out to fix any defect for the safety of the future occupant and to achieved the company standard.

1.3 Research methods

1. Observation- The number of defects is found by observing throughout the period of its construction since first placement at the construction site and will

continue until the end of the Practical training period. The defect that is found has been taken picture off and recorded what type of defect it is, and which house does the defect belong to.

2. Interview- The type of interview that has been conducted for this report is unstructured interview. The unstructured interview has been done with the Site supervisor on the premises of the construction site, the interview is conducted during the observation at the construction site. Furthermore, a semi-structure interview also has been conducted during the period at the premises whenever the Project Manager decide to come visit. The information is recorded by writing in short notes.

CHAPTER 2.0

COMPANY BACKGROUND.

2.1 Introduction of Company.

Hijaun Damai Sdn. Bhd. is a building development company which was first established in 30th April 2013. It's a small company but each of the employees has an over 10 years of experiences in various development and engineering disciplines. Hijaun Damai Sdn. Bhd. has an experience of working with Payaguchi Corporation Sdn. Bhd. for collaboration of a project. Since it first establishes, the company only has one completed project which was the partnership with Payaguchi Corporation Sdn. Bhd. involving 30 house unit.

The Company is run by Ir. Sheikh Al-Hafiz and En. Mohd Shaharil as the heads of the company, Ir Sheikh is a professional engineer that has been involved in various scales of Construction project among other housing development, high-rise building and Highway for the past 19 years and as for En. Mohd Shahril has been working in the property business for the past 15 years and among others has been exposed to various development activities such as planner, conversion & subdivision of land marketing.

2.2 Company Profile.

Below is the company profile for Hijaun Damai Sdn. Bhd.:

No.	TITLE	REMARK
1.	Company Name	Hijaun Damai Sdn. Bhd.
2.	Registration No.	1075774 - P

3.	Business Address	No.46-2, Jalan Sungai Agas 6A/KU3, Taman Sungai Pinang, Jalan Kapar Batu 2 2/3, 41400 Klang Selangor.
4.	Date of Incorporation	30 April 2013
5.	Telephone No. & Fax No.	
6.	Company Status	100% Bumiputera
7.	Authorized Capital	RM 400 000
8.	Paid-Up Capital	RM 300 000
9.	Banker	Bank Islam Malaysia Berhad
10.	Auditor	Azman Ahmad & Co.
11.	Company Secretary	J.Y Zulkefly & Company.

Table 1: Hijaun Damai Sdn. Bhd. Company Profile

Source: Courtesy of Hijaun Damai Sdn. Bhd.

2.4 Organization Chart.

This Organization Chart consist of the employee who is crucial for the company to run smoothly without any problem:

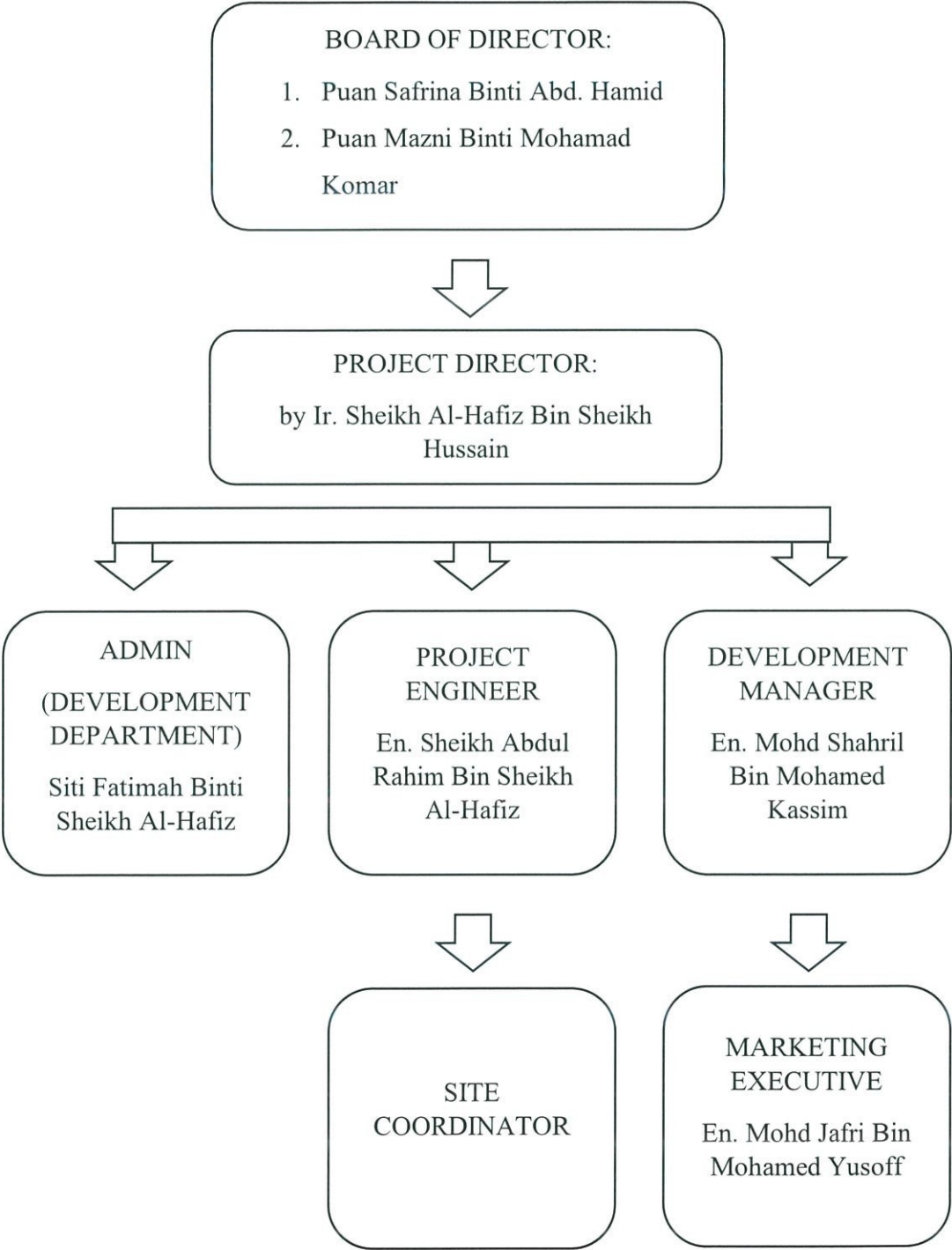


Figure 1: Company Organisation Chart

Source: Courtesy of Hijaun Damai Sdn. Bhd.

2.4 List of Projects:

The past and presence construction project of the Company.

2.4.1 Completed Project

The Project that Hijaun Damai Sdn. Bhd. Has completed since its established:

Project	Cost	Date
1) 30 units residential houses In Mukim Kapar, Daerah Klang, Selangor	RM 23.6 Million	July 2014 – Sep 2016

2.4.2 Project in Progress

The project that is still ongoing to this day:

Project	Cost	Date
1) 6 Unit 1 floor Semi-Detach Houses in Jalan Tarmizi, Mukim Kapar Daerah Klang, Selangor	RM 2.28 Million	August 2018 - Present

CHAPTER 3

CASE STUDY

3.1 Introduction to Case Study

The Project that has been investigated is located at Jalan Tarmizi, Mukim Kapar, Daerah Klang, Selangor Darul Ehsan. This project involves the construction of 6 units 1 floor Semi-Detach residential houses. The Contractor who is responsible for the construction of this Project is Hijauan Damai Sdn. Bhd. The value of this project is approximately RM 2.28 million.

The Project is first started in late 2017 and estimated to be completed on the 27th Oct 2019. The objective of this project is to build new residential houses available on the premises of Taman Hijrah for the purpose of putting them on the market.

A single storey Semi-Detach house has a measurement of 21.05m x 11.73m, which is double the length of the existing residential houses in the area. As shown in appendices 1 the project is located at the far end of the neighbourhood where the amount of traffic that's goes in and out of the neighbourhood is reduced.

Each of the Semi-Detach House contains 4 bedrooms, 2 toilets, 1 Kitchen area and 1 living room. The house is fully tiled and the estimated cost when it is finished is RM 480,000 per-house. According to the contractor all of the house already had buyers to which they can customise the interior design to their own liking which gave the flexibility for the client. The study is carried by doing the practical training at the

project site till it is finished and the information gathered is by the courtesy of the supervisor and Hijaun Damai Sdn. Bhd.



Figure 2: The Observation of Site Location. (Source: Google Map)

Figure 3 show the visit was made at Jalan 1A/KU4, Klang. The duration of the site visit is 3 months.

3.2 The possible causes of defect in Semi-D housing.

There are many factors in the Semi-D housing which contribute to defects. The faults in new buildings were due to problems with design and construction, which are poor workmanship, building materials, defective during construction, and not following the specification, etc. Apart from that, weather conditions, lack of maintenance, existing 15 climates, restricted time and costs will also cause deficiencies to be occurred. All these causes will eventually reduce the value of the buildings and the cost of rectifying it will be expensive if the defects are being neglected by the occupants (Anthony, 2013)

3.2.1 Poor Workmanship

In Malaysia Construction industry, poor on-site workmanship has always been the highlight of the media, particularly in the newspaper, as result of the poor workmanship and the low-quality material used which have been identified as one of the major contributor of defect to exist in construction project when developing new building (Abdulrazak et al, 2010). In addition, the factor contributing to poor on-site workmanship include lack of supervision, lack of work experiences and skill, language barrier, incompetent workers, and lack of communication are the factor that is most influential toward poor on-site workmanship.

According to Anthony (2013), it stated that the defect that exist when a newly constructed residential building to have any defect is due to the result of the contractor and supervisor poor on-site workmanship. However, the contractor played a crucial role at the construction site during the period of the construction project. They are the person who is responsible for overseeing everything from the piling of work until handing over the key to the owner. It can and will become a catastrophe if the contractor is incompetent and neglect their responsibility to supervise the worker, not to mention that the worker may simply construct the structure without the notice from the site staffs. Therefore, it is necessary to always track and keep an eye on the workers activities especially when there is concrete work and when formwork is built.

Other than that, another factor that cause poor on-site workmanship to occur is the lack of experience and competency from the labours. According to Kasun and Janaka (2006), the ideal productivity can easily be achieved by providing a better work practice of the worker and it most important to not based it around by a faster and harder worker. Moreover, the number of skilled workers has been declining for several years and it has been a long main issue that the stakeholders from the construction industry had to deal with, (Jorge et al., 2005). Even though lack of experience and competency will result in poor on-site workmanship but in reality, there's still exist company whom still employ this type of worker. For example, in the country of Turkey they like to employ labour that are used for short term only and has little to no

experience or any knowledge about the construction work is mainly influence by their cheaper salary fee (Kazaz and Birgonul, 2005).

Besides that, due to the local company employ a large number of labours from foreign country had cause the language barrier and lack of communication have contributed to the poor on-site workmanship. This is because the difference language that is used by the local labour and the foreign worker when communicating among themselves. A research has been done by Augusto et al. (2009), it is found that only 18% of the respondents doesn't have any issue when communicating with the foreign worker without a problem about the language barrier which mean an astounding of 82% of the respondents in the survey identified that the common problem that they face at the construction site as the difficulty to communicate with the foreign labour since they mostly speak in their native language. It's not just local labour issue it is also an issue to the foreign labour. In addition, another survey that had been conducted by Kasun and Janaka (2006), it shows that more than 40% of the respondents have complaint about the lack of communication between each other when they are working in the construction industry. As a result, not only the language barrier causes a misunderstanding among the local labour and the foreign labour, but it will also lead to the poor on-site workmanship.

However, there are also possible solution to reduce the increasing rate of poor on-site workmanship. For example, by providing adequate amount of training to the workers according to their respective fields, have a good construction management, strict supervision, and a good communication among the construction parties. A good quality result definitely be set in stone if the workers is provided with training and first-hand experience to the worker, (Chan et al., 2006). Beside that the quality of the construction project most definitely will be satisfactory by enhancing the capability of the site workers.

According to Ghaffar et. Al., (2010), one thing that is crucial to be taken seriously is the supervision of the workers at the construction site. This is to ensure

good quality of on-site workmanship and needless to say the supervisor has to monitor and supervise the work progress at the construction site every single day. By doing so, the problem that can occur cause by poor on-site workmanship can be identified and the repair work can be proceed almost immediately. Apart from that, a competent site manager has to have multiple abilities such as the ability to arrange, manage and lead the work effectively and efficiently so that the productivity of the project will not be affected, (Dai et al., 2009). In a nutshell, a good management is very important in any type of construction project.

3.2.2 Complicated role of the subcontractor.

The defect in a construction project largely is cause by the subcontractor, according to Khalid et al. (2006). It is because the subcontractor played a major role in a construction project. There are two type of contractor, main contractor and subcontractor. The question is why the defect is largely cause by the subcontractor, it's because the main contractor only responsible of 10% and mainly focusing on the management and coordination of the construction project, whereas the subcontractor is responsible about 90% of construction work (Khalid et al., 2006).

Other than that, the labour of the sub-contracting also arises several issues in the coordinating of work and achieving the ideal quality result of a building, (Chan et al., 2006). This is because at a construction site they will usually have several to large number of contractors depending on the scale of the construction project. It will also definitely cause the main contractor to have some difficulties in inspection, supervising and also controlling the quality work that has been done by the subcontractor. This will eventually cause poor on-site workmanship to occur.

3.2.3 Construction Material.

The failure and defects that occur in the building may also be cause by the material itself, whereas the behaviour of the structure will be determined by the construction material. In addition, the behaviour of the structure will also be determined if there's any defect that will surface in the near future. The effect of using

a lower grade than the specification required will started slowly show its effect in a short amount of time, for instance it will start to show in approximately one to two years period. In some cases, it's not entirely causes by the subcontractor of ordering a lower grade material from the specification required just for some extra profit but entirely it may be cause by the material itself to reduce its own quality. For example, when a brick is exposed to the sun directly and without a cover under the changing weather in due time long exposure of this circumstances it will reduce the material quality and lifespan thus increasing the probability of the building structure to show sign of defect.

3.2.4 Inability to interpret construction drawing.

It's the most basic but most crucial knowledge in the construction industry, but there is still some issue arise when interpreting the construction drawing for some individual. This issue often happens at the construction site. The inability of a contractor to interpret a construction drawing and explain in the detail to the workers will cause defect to occur on the building structure and potentially cause it to collapse, just because of a contractor whom to have a poor technical background. This will most indefinitely cause the faulty design to happen and rework needed to done. Thus, because of one mistake from an individual it will increase the construction cost, extend the period of the project, and increasing the manpower resulting in heavy loses.

3.2.5 Faulty Design.

For every construction project, the final design is nowhere near perfect, it's been finalised but it's still yet to be perfect. Error in the design is often to be seen in order to save the initial construction cost. This is because construction cost is basically the controller of every activities at the construction site, for instances "is this design are within the budget" or "is it too ambitious for it purpose and the construction cost can't cover it". it's easy to say that construction cost played an important role when designing the building. Besides that, faulty design that occur in the building it's not entirely everyone fault but it shows the poor performance by the architect or the designer of the building. If there's already exist a failure in the design, then without a

single of a doubt a defect or a number of defects will surface after the completion of the structure.

The faulty design not only affect the comfort of the occupant, but it is also the concern of their own safety. Normally the common design fault in construction is such as inadequate concrete cover, incorrect placement of embedment in concrete, detailing of joints, improper connection details, poor selection of material and product, and flawed structural calculation and loading provision.

All this design error will eventually affect the structure of the building and it will also cost it to not support and distribute the load properly will resulted for the building to collapse in the future. Sometimes, misjudgement for the building design will lead to assumption and decision that are not consistent or the complete opposite with actual behaviour of the structure (Brown, 2001). Even though, the building could collapse at any given time due to fault in design but the legal action against the offender through the proper investigation is being abandoned because of various reasons. That's why the offender is still brave enough to take the risk knowing that they could get a leeway. Meanwhile in Malaysia construction industry, faulty construction is also the main reason causes for building defect and failure cases. The contractor is therefore responsible for the design of the building by using better grades of materials, concrete and processes, as defined with the approval of the client and the consultant.

3.2.6 Not according to specification.

The specification that the architect has given to the contractor must be follow perfectly from A to Z without any shortcut, but if found that the specification is not compliances with the work report immediately inform the architect. Every construction project has its own procedure to be followed to prevent any error from occurring. An experience contractor has his own way or approach in certain cases, and they will choose the best way to proceed based on their knowledge and years of experience even with not complying with the specification that is given.

3.2.7 The Climate of The Area.

According to Dai et al. (2009), extreme weather is one factor affecting the efficiency and workmanship of construction labour. This will contribute to the variables in new buildings that causes defect. Extremely hot conditions will not only impact the workmanship but will also create crack lines on the wall from facing the sun at a high temperature. That is because all of the moisture and the water from the concrete will evaporate by the hot temperature. Evidence from Faisal et. al. (2006), found that Saudi's temperature is high which makes some of the construction work to be very difficult to accomplish, such as preventing concreting. This will affect the quality of the workmanship.

3.3 Types of Defect: The Problem and The Solution.

The defect that exist on the building can originate from various reasons such as poor on-site workmanship, in competent supervisor and etc. the defect can surface at any given time during the lifespan of the building even before it is finished and during the building lifespan it can and will be seen the defect and rework that has been done to the building. The common defect that can be found are cracking, roof defect, peeling paint and honeycomb (blemish).

3.3.1 Cracking.

Cracking is a common defect that can always be found in every construction project. Cracks in concrete are extremely common but often misunderstood. It can surface on various element such as the wall, ceiling, column, beam and etc. depends on the severity of the crack, it can be a quick fix or in worst case scenario it will make the structure to be unsafe for the occupant with the chances of the building to collapse. When an owner sees a crack on the slab or wall, especially if the concrete is relatively new, the owner automatically assumes there's something wrong. This is not always the issue. Some types of cracks are inevitable. Precaution step is necessarily to be used to reduce the appearance of cracking. There are numerous types of crack but in this report, it's going to focus on crazing crack, settling concrete crack, plastic shrinkage crack, and drywall crack.

3.3.1.1 Crazeing Crack.

Crazing was induced by drying out of the concrete surface, so it is particularly common when the surface is subjected to low humidity, high air and concrete temperature, hot sun or any mixture during installation. Concrete contractors can mitigate or avoid insane cracks by beginning to cure after final finishing as soon as possible, particularly on a hard-trodden base. Moist curing is best, although a spray-on monomolecular curing compound also can be effective. Using a drier, stiffer mix can reduce crazing as well. For exterior slabs, minimize the amount of working or trowelling of the surface and use a broomed finish, which tends to mask minor cracks and surface blemishes.

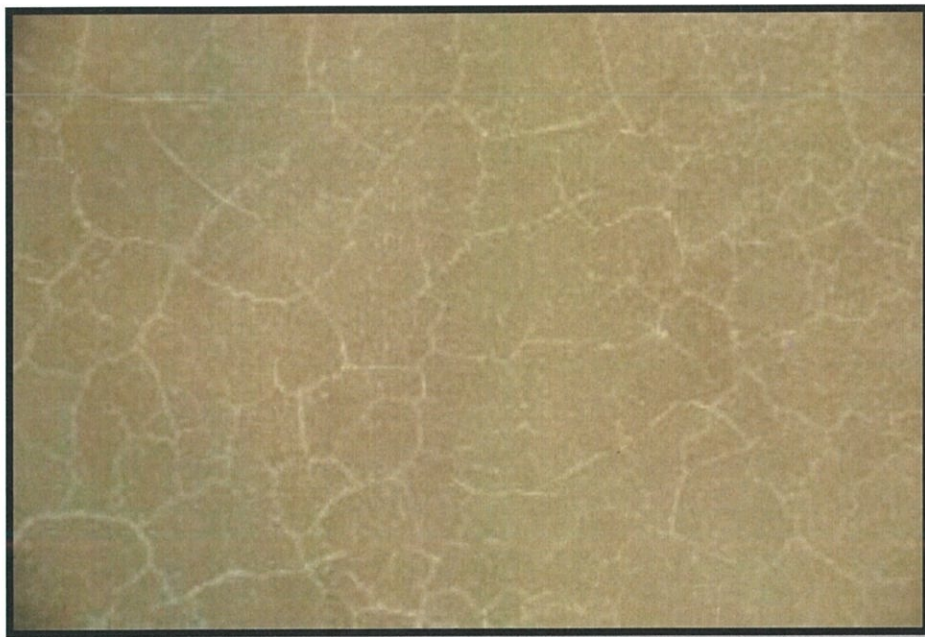


Figure 3: Crazeing Crack. (Source: Hijauan Damai Sdn. Bhd.)

The Solution:

Typically, craze cracking is not repaired because it does not deteriorate over time. Sealers and surface hardeners actually can make crazing more obvious. The only choice is by a thin overlay across the crack.

3.3.1.2 Settling Concrete Crack.

Settling concrete crack occur when there's a void or loose soil underneath a concrete slab causing it to have unstable base resulting occur of crack. For example, if a tree is removed from the ground with closed proximity of a concrete slab, the root that have decomposed. The resultant vacuum can cause sinking of the floor and fracturing of the concrete. Settling is also referred to as subsidence. In trenches where water lines and drainage pipes are concealed, subsidence is very normal. Many occasions when it is refilled, the utility trench is not compacted. When concrete is placed on top of a poorly compacted trench, the void produced by the subsidence can trigger a crack in the unsupported concrete slab.



Figure 4: Settling Crack. (Source: Hijauan Damai Sdn. Bhd.)

The Solution:

Prevention step must be taken before pouring wet concrete on the ground surface. The ground must be compacted thoroughly or repeatedly to ensure the ground surface is completely solid without any void or loose soil. One of the methods is by using a Plate Compactor to compact the soil by doing it will reduce or eliminate any existing void or loose soil in the ground.

3.3.1.3 Plastic Shrinkage Concrete Crack.

Plastic shrinkage is probably the single most common reason for early concrete cracks. It is full of water when the cement is still in its liquid condition (before it is hardened). This fluid takes up space and makes a certain width for the base. It gets a little smaller as the slab loses moisture while curing. This shrinking creates stress on the concrete slab because concrete is a very rigid material. This drags through its granular subbase as the asphalt shrinks. This impediment to their free movement creates stress which can actually break the concrete. The mortar can break in order to relieve pressure when the strain becomes too high for the now hardened cement. Shrinkage cracks may appear as early as a couple of hours after the slab has been poured and completed, particularly in hot weather.

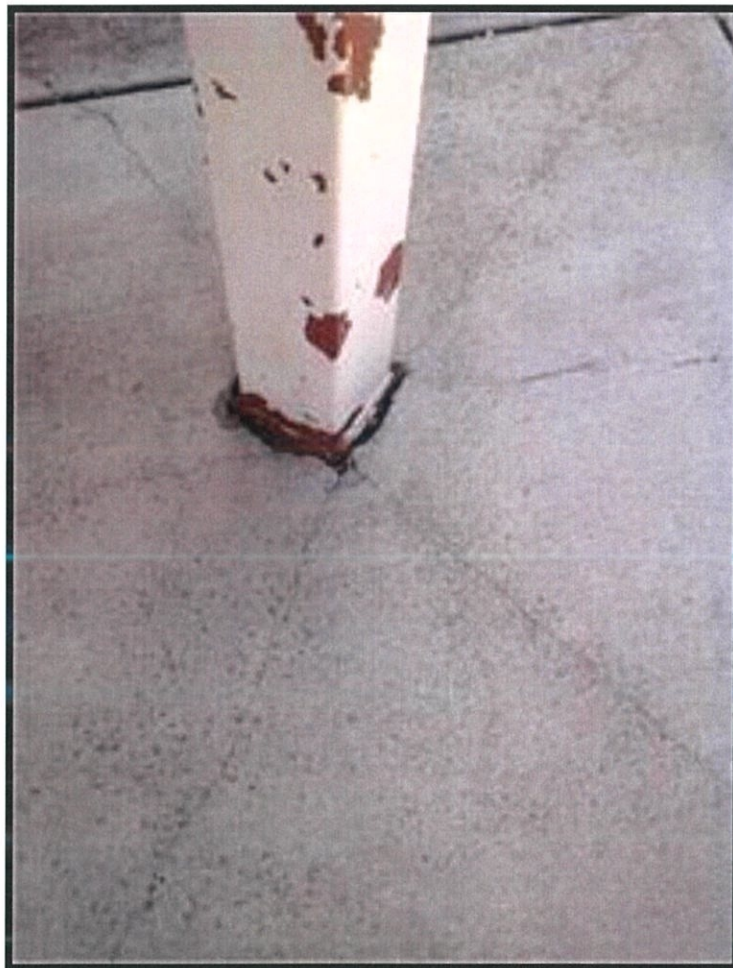


Figure 5: Plastic Shrinkage Crack. (Source: Gramho.com)

Mixing the asphalt so moist is one factor that contributes greatly to the shrinkage. When excess water is poured into the mix, the slab may shrink more than if the right amount of mixing fluid has been used. This is because the extra water takes up more space, pushing apart from each other the solid ingredients in the mix. By doing so, it creates a weaker solution. The solid particles have greater voids between them when the excess water leaves the slab. These empty spaces make the concrete weaker and more susceptible to crack. Unfortunately, it is easier to place and finish weathered concrete, especially in hot weather. This is one factor why many concrete finishers are adding water to concrete mixer trucks: making their work easier. A few liters per cubic meter will not have a significant impact on the combination. However, if an undue amount of water is applied, the strength of the concrete can inadvertently be diminished.

The Solution:

There are several rule or step that is need to be follow in prevention from the plastic shrinkage concrete crack to occur. The rule and step are as follow;

1. Dampen the subgrade and form if there is an increase of evaporation rate.
2. Excessive surface moisture evaporation can easily be avoided just by providing fog sprays and erecting windbreaks.
3. As the weather can also contribute to the existence of the crack it is advise to used colour concrete in a hot weather meanwhile avoid excessively high concrete temperature in the cold weather.
4. Curing can also prevent the crack to occur, it is advised to immediately start curing the concrete as it has been completed.
5. By covering the concrete between operation using a wet burlap or polyethylene sheet plastic shrinkage concrete crack can be prevented.

3.3.1.4 Drywall Crack.

Drywall is a crucial component for its building structure and its aesthetic. Drywall has a tendency to form crack if the installation is not done through the appropriate step. Hence, it's important to pay careful attention when working with

drywall. Weakening the building, wall, and structure are among many other problems that drywall can lead to. It is advised to closely monitor the installation process of the drywall especially around a door as it is having a high chance of forming drywall crack.

Drywall cracks commonly occur on the seam, where two pieces of drywall met. By using drywall mud and tape the seam is usually invisible. The mud fills in the seams and the tape will cover it up. If the seam is exposed to exceed amount of stress than it can handle, drywall crack will most definitely be formed. It usually tends to occur around window, door frames, and corners where high-stress area is located. There are countless of source where the stress can be originated from. Temperature fluctuation can cause the drywall to expand and contract creating stress the cracks the seam. On the other hand, the building structure itself is constantly settling and causes unnecessary stress applied to the wall that will contributed for it to crack. In some cases, whereby the building is constructed on fill-dirt making the settling of the building will be much higher and worse. The seams can only be so strong, so some stress will just be too much for the seams to handle without cracking.

The Solution:

Fixing a drywall crack is rather easy when compare to the other type of wall. The steps are as follow;

1. Cut a 1/8 inch to 1/4-inch V-notch along the length of the crack by using a utility knife.
2. Fill the hole with either mesh joint tape or joint compound and paper tape, accompanied by a thin layer of joint compound on each side of the sheet, reaching around 2 inches.
3. Allow the wall to dry for several hours preferably overnight.
4. As the wall has been completely dry, add a second coat of joint compound on either side of the gap, feathered around 6 or 7 inches
5. Repeat Step 3 and allowing it to dry overnight.
6. By using sand paper or any applicable tools sand out the wall to make it even and smooth.

3.3.2 Roof Leakage.

Roof is defined as a structure that is built on top a building with the purpose of protecting anything beneath, it serves as a barrier from the weather such as heavy rain and excessive sunlight for the occupant comfortability and also for the occupant safety. According to Chong, W. and Low, S. (2005), the probability of leakage from the roof will decrease if the defect from the roof can be minimised or eliminated as well as it's also will extend the life-span of the roof. The common defect from the roof is water seeping through the roof and pooling on the plaster ceiling which will which will eventually show signs of a roof leakage. The water leakage will often leave a circular brown stain on the plaster ceiling thus making it noticeable and reduces the aesthetic value of the room. Furthermore, the water that is pooling will increase the moisture as it will dampen the wooden structure. Normally, roof defects are due to unsealed penetration, roof tiles have missing or improper installation of the underlayment. The roof defect can be classified into two, that is pitch and flat roof defect.

The pitched roof is shaped by two angles that intersect in the middle. It also offers greater stability and structure compared to flat roof and excellent drainage in places that receive high rainfall. Besides that, pitched roof is cover by using clay tor concrete tiles, slate and synthetic slate. Nevertheless, different types of defects may occur with the use of a pitched roof. For example, surface finish deterioration with subsequent moisture penetration, insufficient pitch with backflow, insufficient overlap of material joints and flashing failure at roof and wall junction. In particular, the construction of pitched roof is costly and it's very difficult due to the roof structure, there is a need for additional labours and resources to sustain the roof.

As for the flat roof even though it is called a "Flat Roof" it is not completely flat as it can have a slope up to 10% in contrast with the pitch roof that have a higher slope. If the flat roof has zero gradient and completely flat, ponding will occur as the water has nowhere to go. For example, the rainwater will settle on the surface of the roof. Furthermore, the flat roof is a lot cheaper in to build in comparison with pitch

roof. Flat roof structure is mostly popular in the United Kingdom, ranging from residential housing to car garage. Being a cheaper option doesn't necessarily mean it is prone to defect. The figure below shows if a roof leakage is left untreated for a period of time,

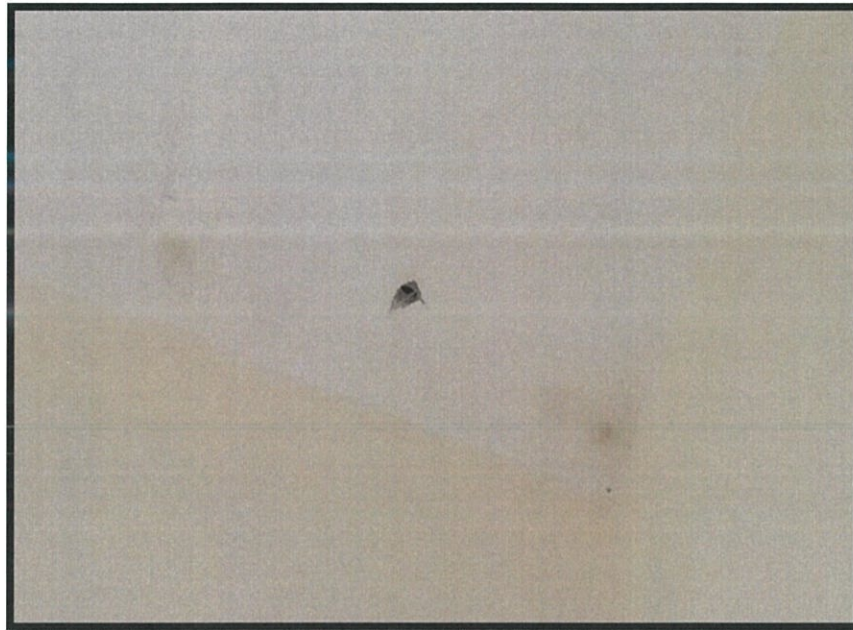


Figure 6: Roof Leakage. (Source: Hijauan Damai Sdn. Bhd.)

The Solution:

The first thing to do is to locate the origin of the leakage came from such as which room or what part of the ceiling is affected. By determining the point of origin, it will give a better understanding to why it has a leakage in the first place. For Example, the 6 Semi-detach housing all have the same leakage and located in the exact room of each houses. After undergoing investigation, it is concluded that the airduct above the room is not properly as water can seep through it.

Secondly, the initial step is by scrub the area of the hole or point of origin with a wire brush. Then fill the area with plastic roofing cement to seal or join the crack. As the time passed, conduct a water test to see if the problem has been solved.

3.3.3 Peeling Paint.

Peeling paint is as its name implied is a situation whereby a layer of paint is peel away from a surface mainly on a wall that is already plastered. Building columns or other parts of a building structure that has been exposed to excessive amount of sunlight or rainwater will cause the peeling paint to occur. For example, if a building is located near the seashore where a high amount of sunlight and humidity can be found will most definitely increase the chances of the paint of the building to deteriorated thus peeling the layer of paint. As shown below,



Figure 7: Peeling Paint in House Unit No. 20. (Source: Hijauan Damai Sdn. Bhd.)

On that note, there another reason why the peeling of paint occurs and that is because the layer of the paint applied is not uniformly distributed. According to Miles (1976), a layer of paint is approximately 0.01 cm if the layer of paint does not have a uniform paint layer there will be an area where it will dry faster than the other area making it easier for the paint to peel. As well as, the thickness of the coating will affect the components of the building which the paint covers.

In addition, the quality of the paint is also the deciding factor if the paint will peel or not. Paint brand such as Nippon Paint or Dulux has a better quality of paint that reduce the risk occurrence of peeling paint. This is due to the fact that every paint has different substances or chemical inside it. Therefore, depending the quality of what it is peeling od paint van easily be avoided.

3.3.4 Honeycomb (Blemish).

Honeycomb is a situation whereby when a concrete is set. there exist cavities or hollow point that the mortar didn't fill in properly (Charles, 2012)., thus weakening the overall strength of the concrete. The name "Honeycomb" originates from its appearance resemble a bee nest. In fact, the appearance of the honeycomb can clearly be seen after the formwork has been withdrawn, exposing a rough and ' stony concrete layer with air voids in the coarse aggregate. In comparison, honeycomb will appear more inside the concrete and honeycomb is usually an aesthetic issue for the contractor and depending on the size and magnitude of the honeycomb it may decrease the member's quality and strength. The existence of air bubbles can lead to the formation of the honeycomb on the concrete surface, resulting in the isolation of aggregate and cement mixture. This will result in damage to the foundation. As Figure show below:



Figure 8: Honeycomb in Concrete. (Source: Civilengineernotes.com)

The incidence of Honeycomb is attributed to several factors. For example, lack of vibration when concreting works are on-going, poor sampling, incorrect placement of the reinforcement bars, inaccurate of water cement ratio will cause honeycomb to occur (Schultz, 2014). Other than that, using a good mix design uniformly vibrating or compacting the cement, utilizing watertight good formwork and preventing separation by correctly pouring the concrete will eliminate the honeycomb from happening.

The Solution:

The solution for fixing the honeycomb that occur in concrete is rather influence by how deep does the honeycomb reach within the concrete. The repair can be easily managed or it will need several hours to days just to fix it. Below are the steps to fix honeycomb;

1. By using a small chipping hammers weighing around 7 kg or less to eliminate the quantity of concrete needed as impact hammers will break the surface of the residual concrete. Continue to chip with sandblast or water to clear the shattered layer.
2. Simply trowel it into the void is a common way of placing the repair material. Yet according to Glenn Smoak, contractor (author of the book Guide to Concrete Repair) can achieve better results by using a compact pneumatic mortar device to add a grout equivalent to a hand-applied dry kit.
3. Using a 1:4 of Portland cement and sand ratio including a water cement ratio of about 0.35. If the repair is deeper than 1 inch (or 25 mm), apply the mortar in layers no thicker than 3/4 inches to prevent bond shrinkage and loss.
4. Approximately 30 minutes have to pass for each layer placement. Each layer is crucial to leave as it is for it to settle on own it's with the help of gravity. However, a closed watch is needed to prevent the mortar to become completely dry.
5. To finish the patch, marginally overfill the gap. After the surface has been partially hardened or set but can still be shaved off with the tip of a steel trowel, chip off the excess material and operate from the middle to the sides. On completion of the patch, take special care to prevent bond damage.

3.4 Prevention method for defect to occur.

Defect can be a minor setback or a huge blow to the construction period and to the construction cost. Therefore, making it an unnecessary investment that need to be prevented by all means possible. However, if the necessary countermeasure or prevented method is taken place it can minimised or eliminated the possibility for the defect to even occur. There's a number of ways to execute it but the main focus is by providing training and education, a stricter supervision, allocation of manpower, and lastly a proper communication among the parties involved.

3.4.1 Provide training and education.

A good construction quality required a good worker. The knowledgeable and experience worker can help to achieved that, but the question is “what if the construction project is mostly compromises of inexperience worker” then the quality of the construction would decrease at an astounding rate. According to Chan et al., (2006), in order to have a good construction quality, it is essential a good training and experience from the related field. Of course, there are other method such as by improving the capabilities of the workers as mentioned by Osama and Khan (2010). This is because by going through the training and gaining knowledge, they will gain necessary abilities and capable of handling work in their own respective fields.

3.4.2 Strict supervision.

Workers tend to take advantage when their superior is not presence to watch over them, they tend to do their work half-heartedly or taking unnecessary long number of breaks. Therefore, According to Ghaffar et. al. (2010), the quality of the construction of new buildings can be enhanced by having a strict supervision towards the workers. It's the supervisor job to regularly inspect every activities and work progress that is in the construction site, by doing so it will decrease the risk of defect to occur and to prevent the defect to become even more worse.

3.4.3 Allocation of manpower.

At a construction site the manpower is the most important aspect aside from the equipment and machinery, but having too many inexperienced doesn't necessarily a good thing. According to Ali & Wen (2011), the allocation of manpower in a construction site will affect the quality of the building. As the saying goes "Quality over Quantity", In this scenario what it meant was the workers aspect. As mentioned earlier, insufficient manpower will also cause the workers to be done in a rush manner which means it will have a negative effect on the building quality. Likewise, a sufficient amount of experienced workers would definitely boost the quality and will produce a good quality building. Moreover, according to Abdulaziz (2010), the source of the production comes from the availability of the manpower. Hence the productivity in a construction project is depending on the workers performance. In the end, the defect can be minimized if the allocation and the management of the project is to be arranged skilfully.

3.4.4 Proper communication among parties involved.

In the construction industry teamwork is everything and to achieve perfect teamwork, it will need perfect communication among the colleagues. That is why communication is very important in construction industry. "if there are no communication, there's will no management", Tai et al, (2009). However, this issue is what to be expected since most of the workers come from another country with a language barrier and then to feel inferior towards their supervisor to an extent of even being afraid to approach them. Thus, it is important to make the workers more approachable so it can better enhance their work ethic.

In addition, contractors and subcontractors also need to communicate effectively with each other, particularly when casting and installing formwork or concreting, to prevent any confusion. False information may cause the entire formwork to be re-installed due to inappropriate interaction. Therefore, adequate communication is important to improve the quality of workmanship and construction by providing accurate data and instruction.

CHAPTER 4

CONCLUSION.

Defect towards a building structure is basically an unwanted condition that will deteriorate or reduces its lifespan. There are countless of causes to make the defect to occur as for example, the Supervisor negligence. Of course, it's the same for the type of defect, given it the right circumstance undoubtedly the defect will emerge. In a nutshell, there's no building in existences that is completely 100% free from any defect that can be inflicted towards it during its lifespan. However, even though the defect can't be completely prevented from occurring but the scale of the defect towards the building structure can be controlled or minimised to a point where the defect can be easily managed or can be completely ignore with the safety of the occupant in mind. For example, a defect that can be ignored is Cracking crack whereby trying to fix it will only make it worse.

Furthermore, by recognizing and identified the reason why the defect had occurred on the building while the defect is in its early stage's countermeasure can be immediately mobilizes to eliminate or fix the defect before it become worsen. But what if the defect that can't be seen unless the procedure is finish. For example, honeycomb in the concrete it can't be seen unless the concrete has hardened and the framework is removed. The defect can be fixed depending on how big of a scale it is, it can take several hours to fix or it can take several days.

In addition, all problem has its own solution. As mention earlier, there are countermeasure to handle the situation with the defect. It can help to prevent the same defect from reoccurring on the building structure. The prevention method is quite efficient in both the construction cost as well as it is practical. For example, by

providing training and education to the workers it can save some of the construction cost if by looking it in a long-term perspective. Moreover, a strict supervision doesn't require an addition in terms of fee but only required a devoted supervisor.

In conclusion, the defects will exist and will continue to emerge on the building structure however that doesn't necessarily mean that it cannot be contained or controlled. If the appropriate step is taken with the help from the supervisor and the labour worker it can easily be manage, meaning that the supervisor and the labour worker must worked together effectively to make sure there is no unwanted circumstances to occur during the completion of the building construction.

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APPENDENCES.

