



Faculty of Engineering

**LOW COST HOUSING EXTENSION AND EFFECTS TO THE  
STRUCTURE**

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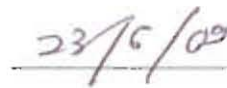
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# **LOW COST HOUSING EXTENSION AND EFFECTS TO THE STRUCTURE**

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This project is submitted  
as a partial fulfillment of the requirements for the award of  
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To my beloved family

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## **ABSTRAK**

Di Malaysia, pengubahsuaian rumah adalah satu aktiviti yang aktif di dalam industri pembinaan. Setiap tahun, teknik pembinaan berkembang pesat. Perkembangan teknik ini juga termasuklah dalam pengubahsuaian rumah. Tujuan pemilik rumah membuat pengubahsuaian ini adalah untuk mencantikkan rumah, menaik taraf rumah untuk lebih selesa. Kajian yang dibuat ini adalah berdasarkan kepada masalah pengubahsuaian rumah dan objektif kajian adalah untuk mengenal pasti factor dan masalah yang terjadi mengenai pengubahsuaian rumah ini. Kaedah kajian melibatkan kajian literature, kertas jurnal, buku-buku dan internet. Kajian yang dibuat adalah melalui borang kaji selidik dan temubual yang diedarkan kepada pemilik rumah yang telah mengubahsuai rumah di kawasan perumahan Bandar Baru Semariang, Kuching, dan kaedah UPV. Data yang diperolehi dikumpul dan akan dianalisa menggunakan kaedah purata indeks. Kesimpulannya, factor untuk pengubahsuaian rumah dan masalah yang dihadapi dapat dikenalpasti.

## **ABSTRACT**

House renovation in Malaysia is one of an active activity of the construction industry. Within the years, construction techniques for new homes have changed rapidly. Most of these improved techniques also apply to renovation works. House owners decided to renovate their houses to make it look better, work better, and more comfortable. Hence, this study focus on house renovation problems with the objectives that included: to identify the factors for the house renovation; to identify the problem occurred during and after the house renovation; to determine if there is structure failure occurred such as cracks in column of the extended houses. The process of this study involves literature review, on books, journals, magazines and the internet. This study was carried out to obtain the necessary data through questionnaires and interviews and by using the UPV method on the renovated houses around Bandar Baru Semariang, Kuching area. The data collected was analyzed using an average index method. In conclusions, the factors identified before and problems after renovation process is known.



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## LIST OF ABBREVIATIONS

IBS	–	Industrialized Building System
PUNDIT	–	Portable Ultrasonic Nondestructive Indicating Tester
$a_i$	–	Constant value represent weight of $i$
$X_i$	–	Frequency for $i$
$i$	–	Average index
PRF	–	Pulse repetition frequency
pps	–	Pulse per second
$V$	–	Pulse velocity
$L$	–	Effective length
$T$	–	Transit time
$T_x$	–	Transmitting transducer
$R_x$	–	Receiving transducer
UPV	–	Ultrasonic Pulse Velocity
SD	–	Strongly Disagree
D	–	Disagree
A	–	Agree
SA	–	Strongly Agree
$X_0$	–	Distance at which change of slope occur

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Housing has always been recognized as a basic social needs and center for a good family development. The rapid expansion of the population increases the development of housing industries in Malaysia. In order to achieve a high level of housing production, the government has to ensure that every family in Malaysia could afford to buy their own properties include the low income group. As a result, the government has to put an effort in providing the low cost housing schemes to this group. Industrialized Building System, IBS is an alternative approach of construction industry towards a systematically approach of mass production of construction materials.

IBS is not new in Malaysia and have been around since the early sixties. The first pilot project was initially by the Government and it was along Jalan Pekeliling which involved 3,000 units of low cost flats and 40 shop lots.



Prefabricated components of buildings which are conceived, planned, fabricated from factories will be transported and erected on site. With this method, the process would involve planning; management and sustained improvement of the production process to eliminate waste and ensure the right components are produced and delivered at the right time, in the right order and without defect. In this respect, the construction industry has a great deal to learn from the manufacturing sectors that have long been emphasizing on quality and minimizing defects. IBS will definitely among others reduce unskilled workers in the country, less wastage, less volume of building materials, increased site cleanliness and better quality control.

## **1.2 Research background**

The low cost housing schemes introduced by the Second Prime Minister of Malaysia, Tun Abdul Razak is an effort to give the opportunity for the low income group to own the low cost houses. Furthermore, under the new economic growth in 1971 the provision of the low cost housing has been focused to ensure that the low cost houses are appropriately located and planned. The aspects of strategic location and infrastructure have become the major element in producing low cost housing.

Previously, under the 7<sup>th</sup> Malaysian Plan, the government has implemented two major policies that need to be done. The first policy is to speed up the low cost housing

and second is to encourage the participation of private sectors in the low cost housing industry.

There is a high demand for low cost housing in this country. According to a recent housing statistics, the population growth by years increased the number of houses in Malaysia. The government expects that 63.8% of the population would be living in urban areas by years 2010, resulting in a demand for more houses. (Source: Department of Statistics and Economic Planning Unit, 2008)

To fulfill the need, the mass production of low cost housing has to be done. As in Sarawak, respectively in Kuching the low cost housing located at Bandar Baru Semariang has been built by using IBS methods.

### **1.3 Problems statement**

In project construction, the IBS method generally arises because of the great demand from the client's requirements for speed of construction and the improved quality. It is kind of trend to use IBS in low cost housing where speed of construction is linked to economy production scale, and the technique also much less wasteful as the installation is less disruptive on site.

After certain period of time, within this area the house had been through the process of renovation due to certain reasons. As the family grows, the size of the house also has to be increased. Else, because house renovation kind of trend and culture in this country. These changes may cause more effect on the structure of the house.

Any structure built on a soil is subject to settlement. Some settlement cannot be avoided, and some can be tolerable depending on the situation. Important factors that influents the settlements are the soil permeability, soil drainage, the water table, the load to be placed on the soil, and the history of the loads placed on the soil. The most common problems related to the soil condition are weak soil uneven settlement, and warped or bowed foundation walls. And effects to the structure are such cracks in slabs, walls or footing unstable. Thus, this extension may cause trouble to the foundation.

In the structural effects, the consideration is that either the foundation can support the existing load which is the original house and the proposed extensions. These foundations also factored by the age of the existing load that is the house. If the house is still new constructed, the risk may be lower.

#### **1.4 Objectives of the study**

The aim for this study is to determine the effect of building structures due to the extensions of the house for the low cost housing have effects to its structure. To achieve this, 3 objectives have been set as below:

- a) To identify the factors for the house renovation.
- b) To identify the problem occurred during and after the house renovation.
- c) To determine if there is structure failure occurred such as cracks in column of the extended houses.

#### **1.5 Scope of work**

This research is done to analyze the effect of house renovation such as house extension towards the structure. To meet the needs of the remaining lifecycle of the structure, renovations and sufficient improvements are essential to economically maintain the environments, and the house life span. To achieve these goals, the research scope will be done at Bandar Baru Semariang, Kuching where IBS method is apply for the house construction. The research will be focused on the house that has been extended.

# CHAPTER 2

## LITERATURE REVIEW

### 2.1 Introduction

House renovation is to make changes to the house for a better living accommodation such as house extension and house remodeled (Schuler *et al.*, 1979). House renovation can be classified as two categories that are house renovated that still maintain its original service and house that extends to new service. For a house renovated that still maintains its original function, the cost is less compared to the house having extension for a new service. Example, repairing wall surfaces compared to concrete floor extension because it is an aesthetical process, which involves changing patterns, colors, or coverings without making changes in fundamental structure, form, or shape. Remodeled process is also the type of house renovation that needs additional spaces to meet the requirement, which means that changes are also made in some of the components of the structure itself. Interior environments are comprised of five principal elements: floors, walls, windows, doors, and ceilings. These are also the five elements of interior renovation because each can be given a wide variety of different treatments.

## 2.2 House renovation

Renovation is a process of restoring material to, or nearly to, its original condition by cleaning, painting, or similar methods. Restoration of ammunition to serviceable condition by operations more extensive or hazardous than routine ammunition maintenance normally involves replacement of components. This house renovation depends on the owner themselves after considering certain aspects. There are many reasons why residential owner done the renovation, but two most common reasons are because of physical problem and to improve comforts for a better living. What it means by physical problem is physical damages to the house and cannot function well anymore. Hence, renovation comes handy this way by repairing. To improve comforts, renovation can be done by extension. It may because of the increase in family member.

However, the extension that will be done must be suitable to the residential environment and supported by the foundation. For extension that involved extra load to the existing ground, the soil condition that is the foundation must be checked at early stage. The building also needs to be considered to avoid the negative impact to that building. The noise during construction also must not bother other neighbor.

### **2.2.1 Caused by the physical problem**

Normally, there are a few major parts of the house that always encounter with this physical problem such as the roofs, kitchens, floors and walls. Usually, these parts are because of some factors like made by bad quality materials and bad workmanship during the construction and maybe do not follow the right specification. Other reasons are it maybe also because the house is too old.

### **2.2.2 To improve comfort**

Nowadays, it is quiet difficult to find home with the basic structure after a few years of tenancy because common activities within the housing scheme area. One or the main reason is to improve living comfort is through providing new spaces in their house why house owner doing this house extension. Due to the increase in family member, the existing house maybe does not suit anymore hence, decide to do extension. This extension depends on the available space of the house. Usually, the extensions are done either at the front or backside of the house. This kind of extension really put the engineer and contractor a lot of challenge.

### **2.3 Factor to consider before renovation**

Before the decision to make the renovation, there are few factors the house owner needs to consider. These factors are such as their financial, the environment, available space they have, the house design, the physical problems, the material that will be use and also the part of the house that needed to be renovate (Stringer *et al.*, 1980). This factors needs to be considered first as to make the renovation process smooth and to avoid any problems encounter during and after the renovation construction.

#### **2.3.1 Finance**

The most important things to consider is either the house owner can support the renovation work financially. The purpose is to ensure that the process is uninterrupted and the construction is done on time. Let say, if the house owner have financial problem, the renovation may be delay and problems may appear at this stage such as the contractor will pause the construction work. Hence, the house owner must think carefully before decide to make any renovation to the house.