ATTACHMENT 1

SYNOPSIS: READY-TO-ASSEMBLE (RTA) MODULAR HOUSING SYSTEM

1.0 BACKGROUND OF THE INVENTION

Self build housing has been widely known as an **alternative construction method** in providing immediate shelter or houses to low-income household especially in developing countries. The invention provides a system adapted to local context based on the principles laid in Walter Segal approach. Though Segal approach has achieved considerable popularity and eventually evolved within the UK market, there is a need to improve its approach when addressing local context of Malaysia. The RTA Modular Housing System is based on an earlier investigation on the idea of self build housing as an alternative to own a house.

2.0 SUMMARY OF THE INVENTION

The **RTA modular housing system** is created based on a **five basic principles** that has a potential to be applied mainly in Malaysia but it is also possible to apply in other countries that require fast erection of either temporary shelter, resettlement or for post-disaster houses. The aim of the system is designed to encourage self build process in providing a house.

The basic principles are:

1. Using available current market construction materials
2. The materials use are either in their uncut sizes or minimal cutting, therefore the sizes of windows and doors correspond to other materials available in the market and promoting zero or minimal wastage on site.
3. The housing components (wall, floor, columns, beams, roof trusses) are modularised to ease the non-skill worker during the construction process.
4. Drawings are kept at smaller sizes (A4 or A3) aided with the schedule of materials indicating sizes, length, finishing and even type of material to suit individual financial capacity.
5. Through modularisation in smaller component sizes, the presence of machineries can be avoided. Hence houses are organised to be built through self build scheme.

2.1 The Grid

After careful consideration, **tartan grids** are applied to separate the structural (columns and beams) with the wall dimensions. This provides the freedom for self builders to decide their own sizes of the structural dimensions without intruding into the wall dimensioning. The independence provided in the structural grid, allows the wall dimensions to provide with variety of room sizes in modular length of 4'.

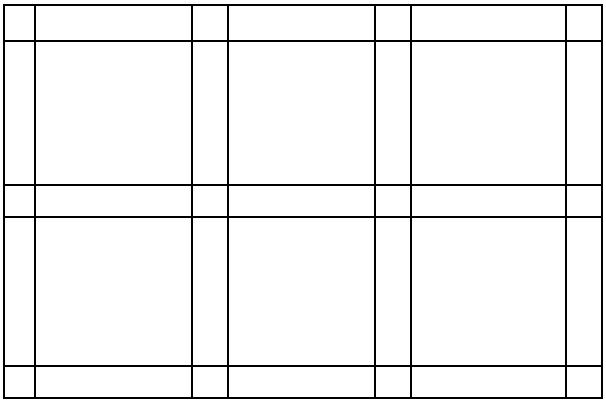

Figure 1: Tartan grid framing.

2.2 The Main Structural Frame

The structural frames of the system are connected only using **screws together with specific metal hangers and brackets**. This is to ensure the components could be recycled or relocated when self builders decide to change their house plans in the future. It could also create the flexibility to even change their elevations based on the changes in floor plans. Such adaptability in the characteristic of the housing system converges the current needs of the household with affordability.

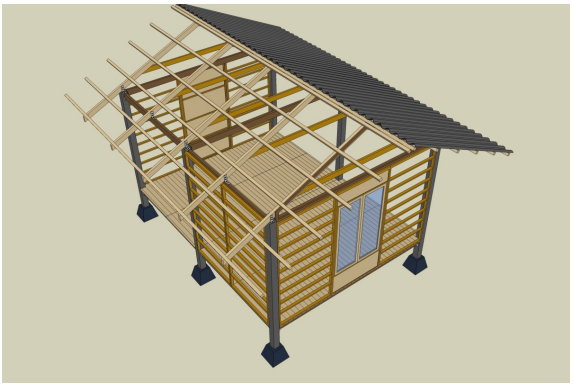

Figure 2: Basic modular plan is based on 4'X4' where multiplicity is easily applied for personalisation and ease of construction.

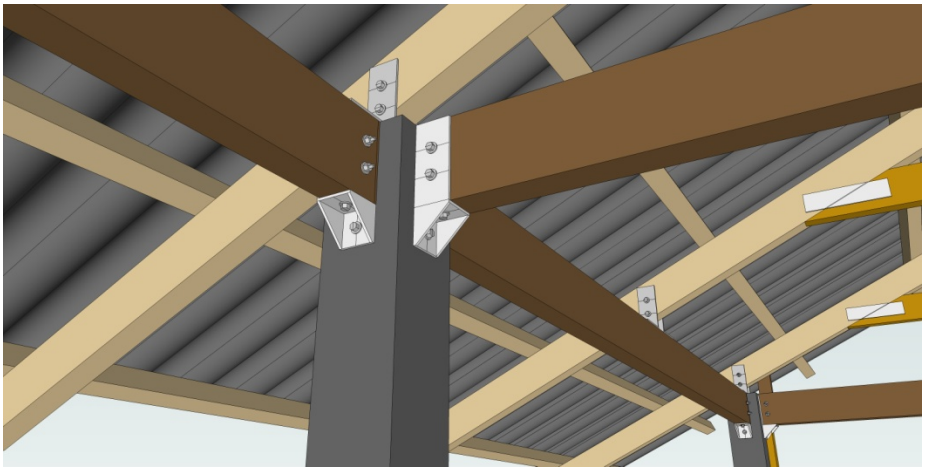

Figure 3: Screws together with specific metal hangers and brackets.

2.3 The Modular Wall

The walls are in **modular panels of 4'X8'** to simplify the assembly process, whereby minimum of 2 persons could do the job. Furthermore, the size is still in imperial dimension as it refers to the sizes of most materials available in Malaysia i.e. plywood, cement board, corrugated zinc, asbestos sheeting etc. This gives the **flexibility** to self builders creating and designing their own facade treatment according to their budget.

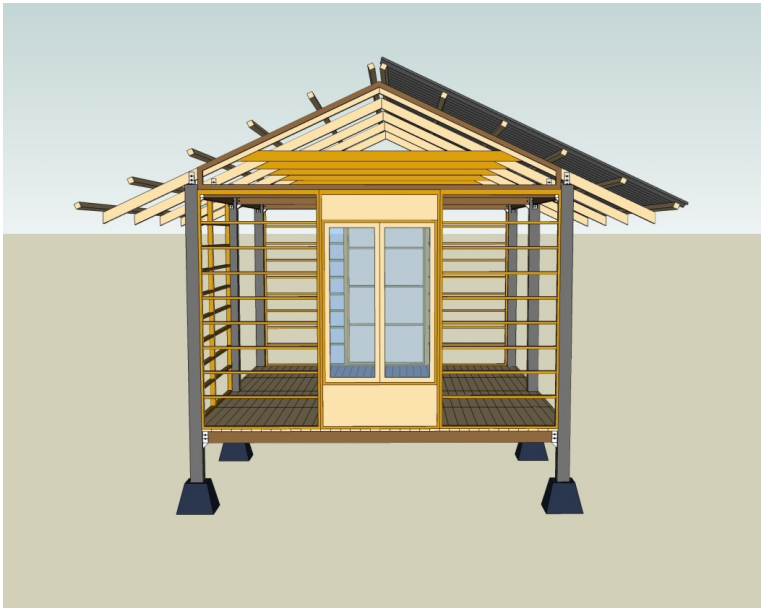

Figure 4: Modular walls of 4'X8' where any materials of these locally available can be used as exterior or interior partitioning.

2.4 The Modular Floor

The floors are also in a **4'X4' modularised section** to reduce error in handling woodwork especially if self builders are non-skill workers. Treatment for the corners of the floor module is cut to fit against the columns. All floor modules will be received by **ledgers** that are readily attached with bolts and nuts to the floor beams making it effortless for self builders to set up the whole flooring section of the house before putting up the wall.

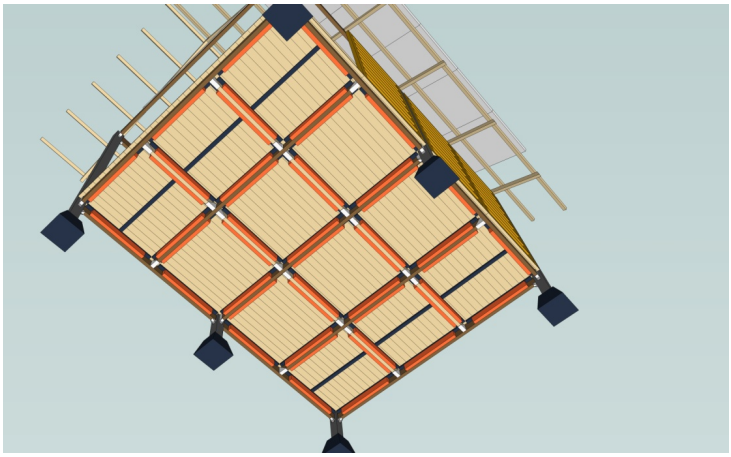

Figure 5: Modular floor based on 4'X4' dimensioning to be prefabricated at factories.

Figure 6: Modular flooring are supported by ledgers that are pre-assembled to the main floor beams.

2.5 The Roof Structure

The roof beams are fixed with **coupled L-angles** to receive roof trusses. The trusses are constructed without using roof ridge instead the **purlins are use**

to tie the trusses together. This is supported with 2”X4” hardwood to double support the whole truss system.

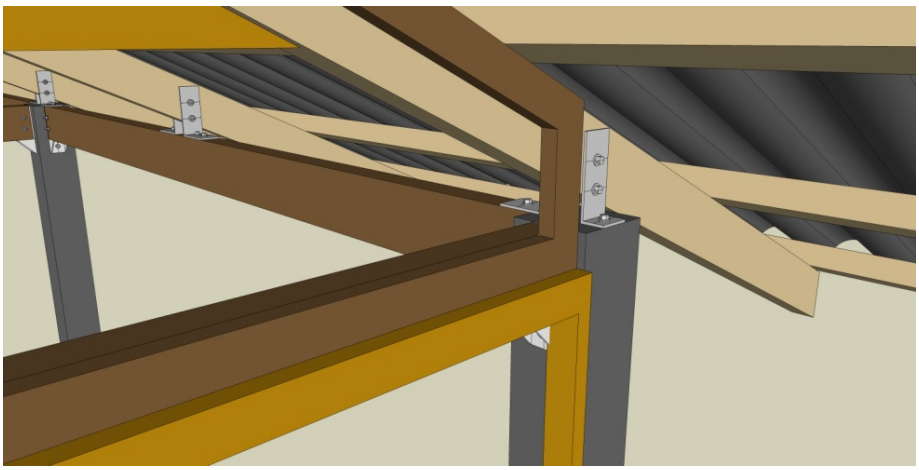

Figure 7: Coupled L-angle brackets to receive roof trusses.

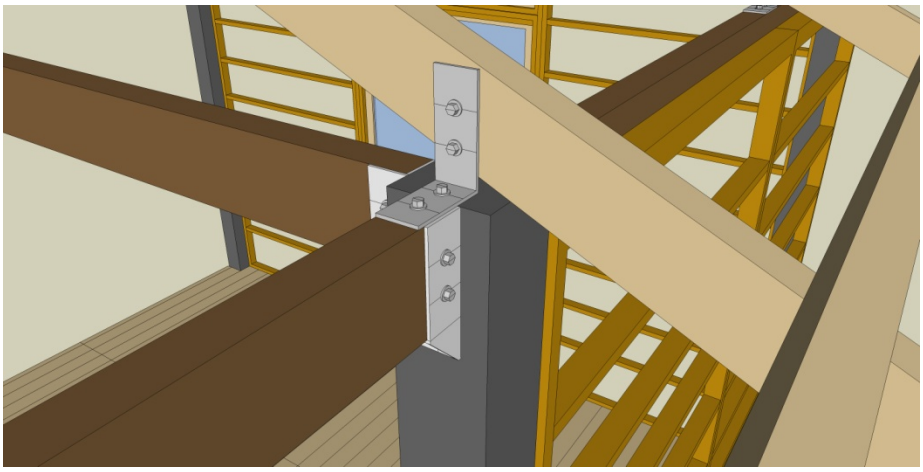

Figure 8: Metal brackets for roof beams are preassembled at factories.

2.6 The Connectors

The connections are using either **bolts and nuts or screws** to promote reuse of the modular components in the system. Due to the flexibility and ease of using these types of connectors as compared to nails, the modular components are able to be **recycled, relocated or redesigned** without damaging the modular components.

3.0 DETAILED DESCRIPTION OF THE INVENTION

Please refer to attached ACAD drawings

4.0 THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. The RTA modular housing system is a combination of self build approach using modular components which uses available materials at local level, giving a plurality of using different finishing materials to suit individual financial plan.
2. The RTA modular housing system defined in claim 1, wherein the modular components are flexible in the planning of the house, can provide unique housing image according to individual preferences and resources.
3. The combination of the modular components using brackets, bolts and nuts and screws strengthen the basic principles listed in localising the construction process to certain area/context.
4. The combination of the modular components using imperial dimensions accommodates the open system of prefabrication in lower technology among the low-income household.
5. When the components are prefabricated in factories, users are free to choose the Species Group (SG) of timber that they can afford for whichever components of the house. Each component is described with size, length and finish in its schedule of materials to determine pricing for financial planning.