

The Preliminary model for the environmental oriental design of **Kaohsiung Houses in Meinong**

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Abstract: There were the actions of Kaohsiung city government to encourage the social participation and the environmental oriental living space to identify the Kaohsiung House. In this preliminary action for the Self-built environmental oriental designed Kaohsiung House was located in the area where most of the cultural livings in Meinong Township of Kaohsiung. The self-constructed method was adopted to create by the local residents in the past life experience and professionalism. In order to make a corresponding discussion again and view their relative potential difference, we try to demonstrate the possibility in drawing on environment and humanity reflected to the existing buildings and Kaohsiung house design principles. The demonstrated farmhouse was belonged to a senior high school teacher who devotes himself to practice the eco-lifestyle and try to follow the Kaohsiung House Actions. Therefore the site was selected in Meinong of his hometown with the base area is 600 m^2 , construction area of 160 m^2 , the proportion was 73% permeable pavement, native grass grown extensively in Eastern create ecological pond. The building was designed by three friends, one architect and with the help by ShuTe University. The house was constructed in major light steel structure for two levels and the double wall system was made in wood and bamboo grid with infilled clay wall. The outer cover is with wood rain edition panels. There were two natural ventilation towers and part of roof system is green roof with rain harvesting system for irrigation. The budget for the building is only 80,000 EURO and provides a natural and healthy living space. A POEM (post occupation evaluation method) measurement was adopted to verify the quality of house and recheck by the ten Kaohsiung House guidelines. The results show a good achievement for this kind of selfconstructed with cultural and environmental oriental design. This project is now become the famous education center for the Kaohsiung House in Meinong.

Preliminary model test, self-constructed, environmental oriental design

Introduction

The Kaohsiung city governement start to push the Kaohsiung LOHAS House promotion from 2011. The ultimate goal of Kaohsiung is to transform from heavy industrial city into a healthy, sustainable and livable area in Taiwan. At the same time, the green building regualtion in Taiwan still has some missing points rather than the efficiency indices, they are the environment and culture oriental characteristics by the spirits of living place. Meinong area is a unique township in Kaohsiung with the Hakka culture and good rural living atmosphere for a quality farm land area. Therefore the city government try to encourage the inhabitants of Kaohsiung to find out the real representive housing model for both new construction and renovating projects. This study was take one of the pilot projects in Meinong, and the house owner was the person who devote himself to create the local identification and try to keep the culture in this region. The planning and design criteria of



Kaohsiung LOHAS House was set as the verification items to review the achievement of this building, and this progress also can give the feedback information to the revise of criteria.

The selected preliminary house in Meinong

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The building is constructed in wood, and the basic components of the RC concrete construction. From the ground base is self-made 1B brick wall from bottom to 100 centimeters heigh as the belt to prevent the moisture damage. The main structure is made by wood structures with the partition brick wall system to strengthen the structure for the earthquake. The roof is constructed by the timber closure system and the roof with the metal tile-like plate. The followings description is the detail. All the design and the construction are done by the houseowner with the academic team and the process is to hire the workers to finish together with the houseowner and students.

(1). A low wall base: 100 cm with 1B red brick piled high, low wall about 20 cm in height to install with a 25 high and 50 cm width switch blinds which give natural ventilation pressure and increase the low-level cooling air into house floor. Above 100 cm height is set the low wall surface to prevent the corrosion and soil moisture affect the main structure of the building.

(2). Wall Design: There are two construction methods to finish walls of the building. The firstone is red brick wall system, and another is plus lime mixed earth with clay surface to finish the wall. Red brick is mainly set in the partition wall of the house. To increase the weight of the roof bearing design, the outer wall of mud stirred fibrous material (rice straw, hemp, *etc.*) and then using lime substances smoothly finish the surface. The differences on materials and construction methods can be concluded by the loads and the corresponding environmental factors.





Figure 1 the form of the preliminary model of Kaohsiung LOHAS house in Meinong

(3). Pillars design: the pillar for the structure are took the used fir poles from the wire rod, and especially houseowner try to find local abandoned old fir utility poles to build the house. Because they are well-structured and are finished in corrosion resistance, they aree good for the column structure of the house, in conjunction with ground-based and roof cladding interface.

(4). Window design: There are four differences of the opening height set. The lowest one is set in 20 cm height from the ground level as the lower opening with adjusted louvers for ventilation. The second level is the normal wood windows with tranpancy glass from the 100 cm height to 250 cm. The third is use for attic set from 280 cm height from ground to get the sunlight, and the last type is the high louver openings for the thermal buoyancy ventilation control.



Figure 2 the hybrid natural ventilation design and the different types of openings

(5). Roof design: The type of the roof is following the traditional "smoke house" to set the double roofs in two slopes, which can have good gigher openings for the ventilation and enough height to prevent the heat accumulation effect from the ceiling. The construction materials were adopted on wood structure in the form of housing, with the shape of the outer layer of tiles painted steel. Although the traditional black tiles materials are adopted, but still keep its quaint traditional architectural impression.



(6). Outdoor space: the design of the building using eaves to create exterior around verandah. The form can create not only external shading and cooling effect for the building, but also outdoor spaces that can linger in the space with a fair share parking shed roof extends to establish linkage of a good connections. The square space following the tradition living style tried to create a channel for the external permeable pavement, and to set the half moon pond by Meinong traditional courtyard as building vestibule.

Preliminary evaluation by Kaohsiung house planning and design principles

Kaohsiung house planning and design guidelines for a total of three core concepts formulated by the Kaohsiung City Government Works. The principle items contain ten design criteria, including environmental sustainability, reflected in the three core health and living in selfevident, and then divided into permeable base plate, effectively shade, green roofs, to import materials and technology, into the design of the image field, creating the courtyard space, human space universal design, appropriate use of space functions, environmental health materials, create effective ventilation openings, etc. Figure 3 shows the structure of ten major design principles for "Kaohsiung LOHAS House" which were drawn based on these four typical areas. The idea of the principles is to take advantage of the adequate sunlight and diverse landforms of Kaohsiung to create Kaohsiung-featured buildings and attract global attention of the local social customs and humanities of Kaohsiung.



Figure 3 the principles of Kaohsiung LOHAS House

Therefore we use the ten principles to review this self-design and made house in Meinong. The achievement shows as followings:

(1). A breathing permeable infrastructure: The case building has more than 70% of the base plate for permeable pavement, and the purpose is to create a zone for thermostat, landscape retention and water permeability.



(2). Effective deep shade: This Meinong building modeled on traditional architecture, which not only designed and created a canopy-style verandah space, but also created an effective building exterior shading. And set in the west to the outer layer of wood windows enhanced activity window shade treatment, effective and flexible treatment of partial shade.

(3). In the introduction to materials and techniques: the use of red brick as a material in the key vocabulary in traditional architecture, the use of red brick building with white walls (adobe house white plaster) impression of traditional architecture and traditional building construction methods, white plaster part of the traditional plaster plus rice straw fiber material. The entries have to import materials and technology.

(4). Integrated into the field of Image Design: Meinong region retains the simplicity of rural landscape and cultural community, in this case the base of the building in addition to the return of the grass outside the building foundation to meet local landscape, interior decoration were also simple way to deal with the design, fully demonstrate the characteristics of the local environment.

(5). To create the courtyard space: The buildings do not have a balcony, terrace, in the outdoor environment with a canopy created by the cloister cohesion relationship building with the landscape between, although not as traditional courtyard houses as there are enclosed plastic atrium space, but there will be staying with the use of outdoor space reservation is still the courtyard space to create tactics.

(6). Human space universal design: space on the first floor of the partially processed universal design techniques, including moving lines smooth, smooth convergence to escape refuge space, entrances size ... and so on, but only the staircase leading to the second floor portion is provided, although the common armrest , but not for wheelchair access, is part of this project is relatively insufficient.

(7). Expedient use of space function: the case of resident population of 4 people, a living room space, a restaurant kitchen, a bathroom, three rooms, a living room, a spare space, the amount of space and function as quite reasonable, not too much or too large design, and fixed pattern Founder, some walls are still in the closet to use as an interior partition walls, is quite reasonable one.

(8). Building environmental health applications: the use of case material in red brick, stucco, wood, steel ... and even abandoned pillars also use fir poles, materials retain the original appearance, without superfluous decoration and painting modified , for the use of environmentally friendly building materials and healthy good case.

(9). Create effective ventilation openings: As stated previously, this case corresponds to local conditions sufficient window section, building orientation and fenestration amount, in addition to creating a normal station of the window opening is generally used, but also set the upper and lower louvers, but also on the transom activities designed to adjust the ventilation louvers, and each window has completely closed to use.



Integrated environment design Healthy material Figure 4 The review items by the principles of Kaohsiung LOHAS House

Effectively openings

Results and conclusions

During the study, we find the self-constructed single house in Meinong, was accepted by the inhabitants and it show a good consistency with the landscape of the place. The precess to build the house and the concept of the house is simple but easy to finish and maintain. The reuse concept help the houseowner save the money to finish the house, at the same time the student joined process which collaborated with university help the house to achieve the quality. After the review by the ten design guidelines, it shows a good consistency except the renewable energy roof and universal design. The reason is the budget and the house is unnecessary to use for disabled people.

From the point of view by the ten guidelines, this house shows a very good example to demonstrate the high quality Kaohsiung LOHAS house is not expand the cost to achieve the standard. The result also shows the social perspectives from the local society to accept this house as one part of the tradition, or transform from traditional concept with enough cultural repectives. The technology and methods of the house are easy to educate the people in this region to think about the house not only the modern building but also need to create the comfortable, healthy, cultural and sustainable building.

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