From Slum to Adequate Homes

- A Study on Housing Solutions for the Urban Poor in Manila, Philippines

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Tryckt i Sverige
Media-Tryck
Biblioteksdirektionen
Lunds Universitet
Lund 2006

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We would like to dedicate this bachelor thesis to our beloved soulmates Robin and Martin. Thank you for all your support.

Abstract

From Slum to Adequate Homes

This report is about the housing situation in Manila, capital of the Philippines. 25% of the inhabitants in this mega city live in informal settlements, often on places unsuitable for living. The target area of this paper is *Baseco*, a large slum area near the outlet of Pasig River and home to 47 000 people according to the 2002 census. Among its many problems including overpopulation and poverty it also has a low load bearing capacity, making it even more difficult to develop.

In 2004 the area was struck by a devastating fire, rendering thousands of people homeless. The local government of Manila engaged two NGOs to solve the housing situation, Gawad Kalinga (GK) and Habitat for Humanity (HfH). They have presently built 4000 adequate houses in the area.

In this report, we have identified the similarities and differences between the two housing-solutions. We have conducted interviews with involved architects and engineers and spent time in Baseco, making observations and interviewing the residents. In addition to the fieldwork we have been studying published sources for more in depth background knowledge. The main objective is that this study will benefit further development in Baseco and other underprivileged areas.

Our first impression of Baseco was positive. Despite the limited budget the area has come a long way from the original slum. The houses are colourful and the environment in pleasant. Both housing solutions are row houses with eight houses in each row. They are easy to construct for unskilled workers. Both HfH and GK uses “sweat-equity”, which means that instead of paying an ordinary mortgage, people have to work a number of hours on the site.

Among the difficulties we identified is the lack of space and poor indoor climate. The ordinary houses are between 20 m² and 24 m² and too small to accommodate the often large families. Most of the residents have gradually put up inner walls and loft to split the house in to smaller rooms which has left the house with poor ventilation possibilities.

We have had all mentioned advantages and problems in mind while we designed two new houses that are suitable for Baseco. One house, *Villa Eva*, is a row-house with a square shaped ground area of 25 m² and a loft. The kitchen is placed on the outside, but under a roof and with protection from three surrounding walls. The other house, *Villa Maria*, is a two storey duplex house with a living area of 49 m² and space for commercial activity. This would be a more expensive solution though.

However, in 20 years, with the existing population growth, the population of Baseco will almost double. Since expanding vertically will be very expensive due to the soft soil, the area will not be able to house everyone and more long-term planning is required.

Keywords: Baseco, the Philippines, Manila, low-cost housing, urban poverty, slum, housing project, Habitat for Humanity, Gawad Kalinga.

Sammanfattning

From Slum to Adequate Homes

Denna uppsats handlar om bostadssituationen i Filippinernas huvudstad, Manila. Där bor 25 % av stadens befolkning i informella bosättningar på platser mindre lämpade för bostäder. Uppsatsens fokus ligger på Baseco, ett stort slumområde vid Pasig Rivers mynning och som vid folkräkningen 2002 var bebott av 47 000 invånare. Förutom överbefolkning och fattigdom har området också problem med dålig bärning av laster, vilket ytterligare försvårar bebyggandet.

Efter en förödande brand år 2004 blev tusentals människor hemlösa och den lokala regeringen kallade in två politiskt oberoende organisationer, Gawad Kalinga (GK) och Habitat for Humanity (HfH). De har till dagens datum byggt 4000 ordentliga bostäder i området.

I denna uppsats har vi identifierat likheter och skillnader av de båda hustyperna. Vi har intervjuat inblandade med arkitekter och ingenjörer. Vi har också spenderat mycket tid i Baseco för observationer och för att intervjua de boende. Utöver fältarbetet har vi gått genom relevant litteratur för djupare bakgrundsförståelse. Den huvudsakliga målsättningen är att arbetet ska vara till gagn för vidare utbyggnad i Baseco och andra liknande områden.

Vårt första intryck av Baseco var positivt. Trots de begränsade resurserna har området kommit en lång ifrån den ursprungliga slummen. Husen är färgglada och miljön är trevlig. Båda hustyperna är radhus, med 8 hus i varje rad. De är enkla att konstruera för okvalificerad arbetskraft. Både HfH och GK använder sig av s.k. ”sweat equity”, vilket innebär att en del av, eller hela, avbetalningen består i ett antal timmars byggnadsarbete.

De problem vi identifierade var bland annat den begränsade storleken och det undermåliga inomhusklimatet. De vanliga boningshusen är 20-24 m² vilket inte är tillräckligt för de ofta stora familjerna. De flesta familjer har efter hand satt upp innerväggar för att dela upp i mindre rum vilket har resulterat i försämrad ventilation.

Vi har haft dessa hus problem och fördelar i åtanke och utefter detta designat två nya hustyper som lämpar sig för Baseco. Den ena hustypen, *Villa Eva*, är radhus med en kvadratisk bottenarea på 25 m² och ett loft. Köket har placerats utanför, men under tak och med skydd från väggar på tre sidor. Den andra hustypen, *Villa Maria* är ett parhus i två våningar med en boarea på 49 m² och utrymme för kommersiell verksamhet. Detta är dock en dyrare lösning.

Med den befolkningsökning som råder på Filippinerna kommer Baseco att nästan ha fördubblat sin befolkning om 20 år. Då det inte är mycket kostsamt att bygga på höjden i Baseco på grund av markens dåliga bärighet kommer området inte att rymma alla människor och en mer långsiktig planering krävs.

Nyckelord: Baseco, Filippinerna, Manila, lågbudget, fattigdom, slum, husprojekt, Habitat for Humanity, Gawad Kalinga.

Foreword

This Bachelor's thesis is the final part of our Civil Engineering program specialized in Architecture at Faculty of Engineering, Lund University, Sweden. It is 22.5 credits which is equivalent to 15 weeks of full time studies. The work was carried out both in the Philippines and in Sweden during spring 2008.

Many people have been supporting us during our work and we would like to take the opportunity to thank these persons:

Foremost we would like to thank everyone at TAO Phil, specially Ms Beryl F. Baybay and Ms Faith Varona who have been very helpful and lent us a room at their office in Quezon City. They have also been translating interviews and arranging necessary meetings for us.

We also would like to thank Chairman Percy Chaves at the PCUP, Alma Valenciano at NHA and Johnny Åstrand and Laura Liuke at Housing Development & Management, Lund University, who have been supporting us through our work.

Finally, our grateful thanks go to Gawad Kalinga and Habitat for Humanity - the two NGOs whose work in Baseco we have been evaluating. Without their willingness to take their time talking to us and answer our questions, this report would not have been possible to finish.

Thank You!

Maria Gehander & Eva Mörnhed, May 2008.

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1 Introduction

The year of 2007 is a landmark in human history as this was the first time that a majority of the world's population lived in urban areas. The most rapid urbanization occurs in the developing world with growing slums as a result. Manila, which is the capital of the Philippines, has a population of nearly 12 million residents. 3 million of those live in slums.

After two and a half years of studies in engineering in Sweden, we both wanted to widen our perspective within construction and architecture and go abroad. We got inspired during a course in our first year when we had an assignment for low-cost housing in Honduras. In the beginning of the last term we took a course of 7.5 credits in International Sustainable Housing. This gave us more in depth knowledge about the technical, economical and social aspects of low-cost housing in developing countries.

We discussed the destination, and after some research and consideration we decided the Philippines to be the best alternative. The country has a major housing problem where a lot of work needs to be done. Therefore, we contacted Johnny Åstrand at Housing Development and Management, Lund University. He provided us with additional information about the situation in the Philippines which helped us to narrow down our work.

Baseco, the slum area named after Bataan Shipyard and Engineering Corporation, is the target of our study. It is a former dumpsite in the Manila port area and the home of 47 000 people according to the 2002 census. The area has been struck by a series of fires and the most devastating one happened in early 2004, leaving more than 2500 families homeless. The desperate situation called for emergent solutions and the local government unit, engaged two Non-Governmental Organizations (NGO) to solve the housing situation. First on site was Gawad Kalinga (GK) followed by Habitat for Humanity Philippines (HfHP). They have, together with the residents and enthusiastic volunteers, built approximately 4000 houses for the poorest of the poor.

With this study, we are continuing the work of our former classmates Sophia Troung and Lina Olofsson. They did a general study on low-income housing in disaster prone areas, titled "Sustainable Housing in Navotas, the Philippines". We decided to look at a specific area and compare two different housing solutions to each other. We hope that the result of this report will benefit future urban development in underprivileged areas.

1.1 Objectives

The main purpose of this study is to increase the understanding of the urban development in underprivileged areas. Our wish is that this study and knowledge can contribute to the planning and management of future housing project in the Philippines and other countries with similar conditions. The intentions are also

to contribute with knowledge from Sweden and bring new, innovative ideas and perspectives. Another purpose of this study is to bring knowledge to Sweden about the housing situation in developing countries.

The study has the following specific objectives:
1. Identify the problems and the advantages of the housing projects implemented by GK and HfHP in Baseco.
2. Propose an improved housing design for similar conditions.

1.2 Problem Definition

The housing problem in the Philippines has resulted in several low-budget housing projects for the urban poor people living in informal settlements, in order to provide them shelter and improve their quality of life. The depressed area of Baseco, the area of our field study, has been remarkably improved by two NGOs. But because of the limitations, both in budget and land development, the housing solutions have not been adapted without difficulty. Therefore, the problem definition is: *Do the houses provide adequate shelter and satisfy the basic needs?* And more specific: Is the indoor climate satisfying? Do the houses have an architectonical appeal? Are there adequate water and sanitation systems? Are the houses spacious enough? Is it affordable to live there? And last but not least, *do the communities have long term sustainability?*

1.3 Method

Several methods have been used during the work to complete this report. As mentioned before, our base is our education in civil engineering which includes international building technique in developing countries. Before we left for the Philippines we went through a preparatory phase of literature studies. We read about the country; the culture, climate, politics and history.

We went to the Philippines in March 2008 and spent one month doing field studies. We interviewed architects and engineers who had been involved in the projects in Baseco. They showed us drawings, told us the reason of the design, how the villages are organized and what economical resources they have. We paid visits to both Gawad Kalinga's and Habitat for Humanity's headquarters, as well as the Asian Development Bank library.

Quite a few days were spent in Baseco to see the houses in the actual area. We talked to several of residents and conducted twelve structured interviews, six with residents in the GK village and six with residents in HfHP's area.

Apart from Baseco, we visited several of other housing projects, both low-budget and more exclusive, including housing projects by both Habitat for Humanity and Gawad Kalinga in Taguig, one of the cities of Metro Manila, as well as housing projects by National Housing Authority (NHA), the authority responsible for housing the lowest income group in the Philippines. They gave us

the opportunity to visit National Government Centre, a slum upgrading project in Quezon City, the largest city in Metro Manila, as well as two projects in Cebu Island, one of the provinces of the Philippines and the location of their second largest city Metro Cebu. We also visited a newly developed middle income housing project implemented by a private developer in Taguig. This gave us a general idea about the culture and how Filipino residences are constructed according to their perception on functionality and design.

2 Background

A general background on the Philippines, its climate, people, history and housing situation will be presented here, to provide the reader with the necessary facts for further understanding of the countries overall situation.

2.1 Climate and Geography

The Philippines is an archipelago that consists of more than 7100 islands in South East Asia, surrounded by the Chinese Sea in the west and the Philippine Sea in the east. The total landmass is approximately 300 000 km² and is divided into three groups of islands, Luzon –with the capital city of Manila, Visayas, and Mindanao. (www.cia.gov, 2008)

Fig 1. Map showing the location of the Philippines in South East Asia (www.yellowpages-cambodia.com)

The climate is tropical marine with a rainy season from June to November and a dry season from December to May. The dry season can be divided into a

cool and dry season from December to February, when cooling monsoon winds enters the islands and a hot and dry season from March to May. The rainy season brings in monsoons with heavy rainfall. The northern and eastern sea border is prone to devastating typhoons and is usually stuck by around 20 typhoons a year.

The mean annual temperature is 26.6 degrees and varies little over the year close to sea level, although places at a higher altitude might have a cooler climate. Surrounded by warm waters the relative humidity is high, ranging from 71% in March to 85% in September. This makes the operative temperature very high and especially uncomfortable during hot months of March to May. Note that although Sweden has approximately the same relative humidity, the operative temperature is much lower due to the cooler temperature.
(www.pagasa.dost.gov.ph, 2008)

Fig 2. Climate comparison

	Manila*	Lund**
Mean annual temperature	26.6°	7.9°
Humidity	71-85%	77%
Annual rainfall	2000mm	666mm

**PAGASA*
***SMHI*

2.2 Political Development

Although rich in resources and a growing economy, the Philippines is still a developing country in some aspects. To shed some light over the situation a brief overview of the history is in order.

The Philippines was first inhabited 30 000 years ago and was then "discovered" by the Spaniards in 1521 by Magellan's expedition who named the islands after the Spanish heir to the throne, Philip II. The Spaniards colonized the archipelago for 300 years and introduced Catholicism which still is the national religion. The Spanish rule was stressed by conflicts regarding economical interests with the Chinese as well as the Muslims fight for independency in the southern Island of Mindanao, a conflict which still has not been solved. A growing movement for independency among the Filipinos led to a declaration of independence in the 1890's. However after the Spanish-American War in 1898 the Philippines were declared an American colony.

In 1935 the Commonwealth of the Philippines was established with a promise of full independence within ten years. Manuel Quezon was the first president to be elected and his name is today found in Quezon City, the largest city in the Philippines and part of Metro Manila.

The islands suffered greatly from the war between the Japanese and the Americans during World War II and Manila was largely destroyed by bombings.

In 1946 the Philippines received full independence and were declared The Republic of the Philippines.

Unfortunately the problems had not come to an end. In 1965 Ferdinand Marcos became president but soon declared martial law and gained absolute power. He ruled the country as a dictator for over 20 years, until 1986 when Corazon Aquino, the late wife of the assassinated leader of the opposition, Benigno Aquino, led the *people power* uprising which overthrew Marcos. Marcos fled to Hawaii where he died a few years later, alleged by the new government to have embezzled billions of dollars.

Corruption has since still been heard of. President Joseph Estrada who was elected into office in 1998 was forced to stand down due to allegations on corruption and violation of the constitution. Vice president Gloria M-Arroyo became the new president and won the election in 2004. Estrada was found guilty of massive corruption in 2007 and was sentenced to imprisonment for life, although president Arroyo pardoned him shortly afterwards and he was released. (http://news.bbc.co.uk, 2008)

2.3 Demography and Economy

In the 1850's the Philippines and Sweden had almost the same population - around 4 million people, although it should be noted that the Philippine census excluded non-Christians. The Filipino population has grown considerably since then, with an annual growth rate of 2-3%, and is estimated to surpass 90 millions in 2008, ten times the population of Sweden. As a result the density of the population was 255 persons per km^2 in the year of 2000, compared to only 22 persons per km^2 in Sweden. The high density of people makes access to land an important issue.

The life expectancy is 66 years for men and 71 years for women and the average family size is 5 persons. 37% of the population is between 0 and 14 years old.

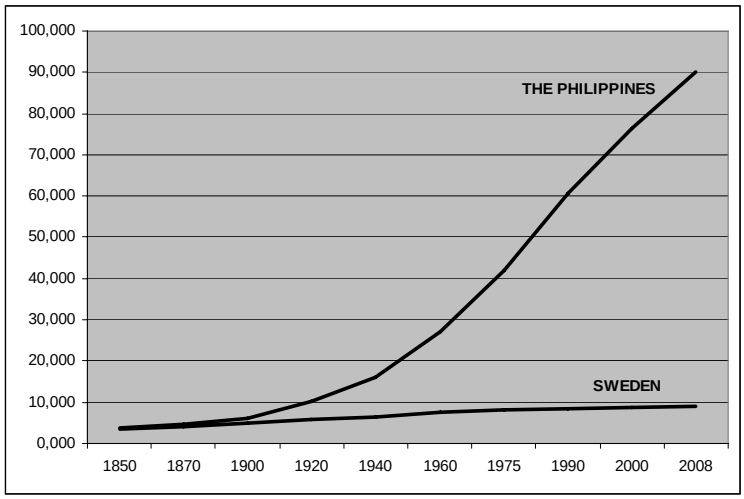


Fig 3. The population i Sweden and the Philippines** from 1850 – today.*
**SCB **NSO*

The Philippine economy is growing rapidly. 8 million Filipinos or 23% of the workforce work abroad, sending back remittances that help strengthening the economy. In 2007 14.5 billion dollars was remitted. The rising economy pushed back unemployment from 8% in 2006 to 7.3% in 2007 and underemployment from 22.6% to 20.1% mainly due to high work force demand in construction and services. Asian Development Bank (ADB) considers the government finances to be on target with creating an economy less sensitive to macroeconomic fluctuations. The ADB also estimate that the increased tax revenues and stricter budget will make more room for investments in infrastructure and social services for the poor. (www.adb.org)

3 Urban Poverty and Housing

The year of 2007 is a landmark in human history as this was the first time that a majority of the world's population lived in urban areas. The most rapid urbanization occurs in the developing world with growing slums as a result. United Nations Millennium Development Goals aims to "*achieve significant improvement in lives of at least 100 million slum dwellers, by 2020*," which although a high number is not nearly enough. (www.un.org) In Metro Manila alone, the capital city conglomerate, 3 million out of the 12 million residents live in slums. (www.manskligarattigheter.gov.se)

Fig 4. The rapid development of slums in urban areas is problematic. Like this photo from Manila shows, they often develop on unsuitable and hazardous sites.

3.1 Poverty in the Philippines

The poor are defined by the Republic Act 8425 from 1997 as *"individuals and families whose income fall below the poverty threshold as defined by the government and/or those that cannot afford in a sustained manner to provide their basic needs of food, health, education, housing and other amenities of life."* In 2003 an estimated 24% of all Filipino families did not earn enough to meet their basic need for food and other basic supplies, which in fact is an improvement from 2000. The minimum income estimated for a family of five in 2007 is a monthly PhP 6 195 (940 SEK*), an amount usually demanding more than one income earner. (www.nscb.gov.ph) Rising prices on oil and food has pushed the annual per capita poverty threshold from PhP 12 309 (1865 SEK) in 2003 to PhP 15 057 (2280 SEK) in 2006, which has disrupted the trend from 2003 of decreasing poverty. (www.adb.org) (*www.forex.se, selling rate 0.1515, 2008-05-16)

3.2 The Housing Situation

The Philippines has a rapidly increasing urbanization, today almost 60% of the population live in urban areas. The annual rate of urbanization has been 5% from the 1960's and slowed down to around 3% in the mid-90's. This matches the rate of urbanization in East Asia, although the Philippines has not experienced the same level of economic development that usually follows increased urbanization. (The World Bank, 2002)

The level of urbanization can be explained with a high national birth rate, which is higher in urban areas and with the migration from rural areas to urban that occurs when people move into the cities from the countryside in search of better opportunities. Baseco, the slum area and target of this study, is a typical area in both these aspects, displaying large families living in an area with a high immigration. The location of Baseco near the port of Manila provides a lot of job opportunities and is a one of the first sites for immigrants from other islands to arrive to.

The high rates of urbanization in the Philippines can also be explained by a reclassification of rural areas, which has reached a certain population density, to urban areas, which might partly explain why the Philippines has had a lower economical development relative to urbanization compared to other countries in the region.

The rapid urbanization presents several problems as land becomes scarce and more expensive and the rate of urban development does not match the growth of the population. The government aims at providing 1.2 million new households although there would still be a need for 3.3 million additional housing units. (Philippine-Canada Local Government Support Program)

The emergent need for housing has produced large amounts of "spontaneous settlements" or slums. Spontaneous settlements are those which have developed without any official planning. Slum dwellers refer to the urban poor who live in communities where the physical surroundings are in poor

condition, also called depressed areas. Makeshift dweller is another term that refers to those who live in buildings made from makeshift, salvaged or scrap materials. A slum area may include non-poor residents and the diversity of terms contributes to the difficulties of actually determining who and how many the poor actually are.

Squatter is another term referring to those who illegally occupy land owned by others. In recent days terms like *professional squatter* has developed referring to people who gets legal access to a house but chooses to sell it in order to live from the profit while continuing to squat. It can also refer to those who sell squatted land, which the have no legal ownership of, to other squatters.
(Rebullida, Endriga, Santos, 1999)

Fig 5. In this slum in Manila, there would be no chance for a fire apparatus to enter.

According to our observations there is a tradition in the Philippines of owning your own lot of land, no matter how small. This results in vast areas of low-rise buildings and patches of high-rise buildings collected in Central Business Districts (CBD). Slum areas are typically low-rise buildings and the tradition of landownership results in very small lot sizes, packed together tightly with small and irregular pathways between. Since slums develop without any official planning basic services like electricity, water and sanitation is lacking. They are also more prone to fires due to the poor construction and fire apparatuses and rescue vehicles usually have a hard time entering. Although slums can be found in forgotten or unused areas of the city, many slums often develop on unsuitable

and hazardous sites. It might be along railways or motorways, on dumpsites or in areas prone to natural disasters such as landslides and floods.

3.3 Housing Policies and Actors

The earliest method of solving the issues with squatters was simply to evict them and relocate them to resettlement sites. The resettlement was problematic as the sites often lacked basic facilities and infrastructure and the distance to their workplace grew. During the Marcos years the first programs for on-site development took place. Slum upgrading has the benefit that people don't have to move to new areas. But the government was criticized for failing to benefit the poorest of the poor.

During Aquino the government adapted the United Nations Global Shelter Strategy (GSS 2000) with the standing point that shelter needs to be affordable even for the lowest income group. The Housing and Urban Development Coordination Council (HUDCC) was established to synchronize the housing efforts. Focus shifted to socialized housing (described on page 21) and a number of adjustments was made on how to address the housing problem, including beneficiary participation and the involvement of NGOs. (Rebullida, Endriga, 1999)

Relocations are still used when the site is clearly unsuitable or if it is not possible to acquire legal rights to it. But other solutions such as reblocking and slum upgrading are being used, where the squatters acquire the legal rights to stay where they are and the necessary adjustments are made to provide descent infrastructure and shelter.

The HUDCC is according to their website the "highest policy making body for housing and coordinate the activities of the government housing agencies to ensure the accomplishment of the National Shelter Program". It is coordinating the efforts of 4 shelter agencies, 3 funding agencies, 7 government support agencies and 2 private sector representatives from NGOs and private developers. (www.hudcc.gov.ph)

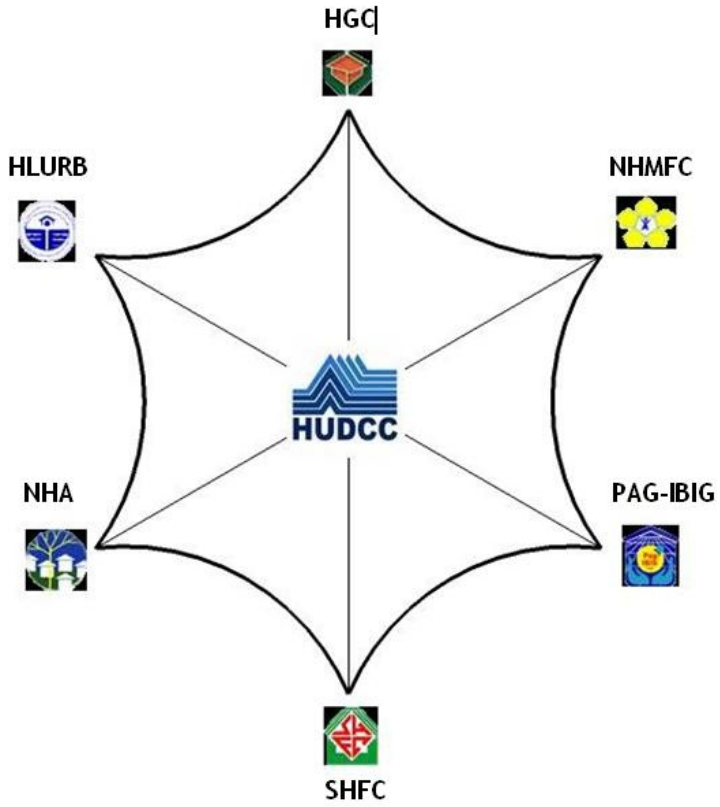


Fig 6. Schematic view of agencies involved in housing to poor in the Philippines.

Figure 6 shows a part of the total organization in a schematic way and the agencies are briefly explained below.

HGC Home Guaranty Corporation
-Provides risk coverage for home financing

HLURB Housing and Land Use Regulation Board
-Deals with issues of land use, zoning and subdivision of plots

NHMFC National Home Mortgage Finance Corporation
-The major government mortgage institution

NHA National Housing Authority

Pag-IBIG The Home Development Mutual Fund
-Another funding agency

SHFC Social Housing Finance Corporation
-Subsidiary home mortgage agency

According to *Statistical Indicators on Philippine Development of 2006* the governmental housing sector has produced mixed results. The number of shelter security units produced has declined since 2004 as has the value of shelter security units constructed, financed and/or administered by the government. It is worth mentioning that licenses issued for residential units have been above the target for each year. Also the number of days required for processing loan applications has been reduced by half from 2004 to 2006, from 30 days to 15, which indicates that the process of acquiring improved housing has become smoother. (www.nscb.gov.ph, 2008)

3.4 Low-cost Housing Types

The housing solutions for low income groups can in the governmental housing sector be divided into four types.

Socialized Housing is when the house and lot has a value below PhP 225 000 (34.000 SEK). The lot sizes are small and the houses are usually of a row house type with limited room for expansion. By urban planners this type of housing should be considered transition housing, only to be used until the family has enough resources to move to a higher housing category.

Low-cost housing refers to house and lot with a value between PhP 225 000 and PhP 500 000 (34.000-76.000 SEK). Most houses are single detached or duplex types but it can also include units for sale in medium-rise buildings.

Medium-rise buildings or MRB's are residential buildings of not less than three and no more than five storeys; the upper limit is the number of floors allowed without the installation of an elevator. MRB's are found in high density urban areas.

Economic housing is house and lot with a value of no more than PhP 2 million (300.000 SEK). (Philippine-Canada Local Government Support Program, 2003)

4 Building in a Developing Country – A Challenge

4.1 Traditional Housing

It is advisable to look at the traditional building technique when new housing projects are designed. It has been developed during a long time and shaped after the needs under the existing conditions. The culture, the climate and the access to materials have all influenced the design and technique of houses and other buildings. Using local knowledge and local materials lower the price and facilitate reparations. (Åstrand, 1994)

The nipa huts are the traditional houses in the Philippines. They are still used today, especially in rural areas. It is made of local materials like the nipa

palm, bamboo and thatched roof of dried cogon grass. The hut stands the basic shelter needs, but it does not withstands the typhoons and needs continous maintenance. Metro Manila has a low supply of traditional material and it is both too expensive and lacks the durability to be an alternative. The rural expression of the houses also makes them unsuitable in an urban environment. The construction is otherwise good because of the light weigth and the natural ventilation it provides by not being airtight. (Interview with Manuel S. Zeta 2008-03-31)

Fig 7. A nipa hut in Bohol.

4.2 Building materials

Building materials tend to decline faster than expected in warm, humid climates due to solar radiation, rain, humidity, strong winds, mould and insects. The high temperature encourages chemical deterioration. The life expectancy of concrete is halved with every 10° C of increase in temperature. Massive damage is caused by typhoons and driving rain. (Adamson and Åberg, 1993)

It is recommended in warm-humid climates to use lightweight materials for a comfortable indoor climate, since the difference between day and night temperature is insignificant. In hot, arid climates a heavy construction can accumulate heat during the day which can be released during the night, but this effect is lost in a tropical country like the Philippines and a heavy construction would only continue to accumulate heat. (Rosenlund, 2000)

Although lightweight materials are recommended for indoor comfort, most buildings are made of heavier materials. In the Philippines 30% of all buildings

are made of concrete, brick or stone, 23% is made of wood and another 19% is a combination of both. The traditional nipa hut adds up to 23 % and the rest is different materials including salvaged and improvised materials. The most common material for roofing is galvanized iron or aluminium sheets which consititutes 68% of all roofs in the country. The thatched roofs of the nipa huts is another 22% of the total. (www.nscb.gov.ph, 2008)

Building materials used for low-cost and slum housing ranges from homemade, improvised construction materials of scrap metal and cardboard to more durable materials like concrete hollowblocks.

4.3 Indoor Thermal Comfort

When the temperature goes above 25 – 26°C in tropical climates, human comfort requires air-condition. Air-condition is an expensive investment which is highly energy consuming and is therefore rarely used in low-cost housing. These houses are usually built as passively climatized houses with other parameters that keep the temperature down. However, it can be difficult to keep the temperature within the human comfort range, and the temperature is often above 26°C. The climatization of a passive house is done by the building itself. (Adamson and Åberg, 1993) The design helps the building to take advantage of the climate when it benefit the needs, and protect the building when the climate is less advantageus. Heat reduction is most easily done be excluding it rather than removing it.

The purpose for ventilation is not only thermal comfort but also health and removal of moisture. (Rosenlund, 2000) High levels of moisture and inadequate ventilation lead to increased emission of chemichals from building materials and finishings. This creates a good environment for mould, algae and mites, which can cause hypersensitivity in the respiratory system and develop allergies for humans. Together with pollution from for example cookstoves can worsen the effect. The concentration of indoor pollution increases with decreased ventilation and it is therefor of crucial importance with ventilation, especially around the kitchen.

The ventilation rate is dominated by the wind. Therefore, the house has to be oriented according to the prevailing winds. Most important for good ventilation is the size of openings, both in the outer walls and between rooms. Unventilated spaces should be avoided.
The size of the window is affects the indoor climate. If the windows aren't shaded, the glass area must be limited to 15 % of the facade area, seen from the inside. Therefore it is important to shade the windows, especially the ones facing the sun. This is done by solar shading glasses, blinds or shutters and screens on the outside. (Adamson and Åberg, 1993)

The placement of the windows are important. It is essential in warm-humid climates with cross-ventilation. This increases the air speed which promote evaporative cooling of moist skin. The windows should be placed quite low, since

it gives an air flow in the occupation zone. The closer the windows are to the ceiling the less effective the ventilation is. (Rosenlund, 2000)

4.4 Building against Natural Disasters

Natural disasters cause great loss in terms of human life and property. Studies indicate that it is the non-engineered buildings which are constructed spontaneously that gets most affected.

Earthquakes are one of the most catastrophic natural disasters which have caused immense loss worldwide. The foundation is very important in order to stand the earth-quakes. Common failures of the foundation are inadequate depth and differential settlement of foundation. It is recommended to build with light materials in contries where earth-quakes are common. Suitable buildingmaterials are steel and timbre. Masonry walls are less safe in earthquake areas. If it is used as a construction material it should be reinforced masonry walls with strong mortar. A masonry wall can be improved by avoiding joint angels of 45º to the ground, since this is a common angle for cracks caused by earthquakes. The house should be symetrical along both axles and the ratio between the length and width shouldn't be more than 3:1 To be as earth-quake safe as possible, long and narrow houses should be avoided. Though, long and narrow buildings can be stabilazed by crossway walls which divide the building into squares where the lenght is not longer than the width. (Åstrand, 1994)

Typhons are an other typ of natural disasters that occor in the Philippines. The surroundings are important to control the very strong winds. Trees and hedges reduce the force from the winds and are therefore useful to protect the building. The building itself is more resistant to typhons if the height is the same as the length and the length is 50% longer than the width. (Lal, 1996) The roof overhang is vulnerable to strong winds and a length of more than 800mm is not advisable in areas prone to typhons. It is very important that the roofing material is securly attached to the battens and that the rafters are secured to the walls. Sometimes, in areas with very strong winds, that is not enough, and the rafter have to be attached to the ground as well. (Åstrand, 1994) Wind has the least effect of the roof with a slope of 30 – 40º. Angles less than 30º deflects the force of the wind. (Lal, 1996)

5 Baseco - The Area of the Field Study

This section presents our field work starting with a background on Baseco and the two Non-Governmental Organizations Gawad Kalinga and Habitat for Humanity, followed by the observations and interviews made there.

5.1 Baseco in Manila

The smallest administrative division in the Philippines is called a *barangay*, which means village or district. Barangay 649, BASECO is the formal name of the

district south of the city of Manila near the outlet of Pasig River in Manila Bay. The port area was formerly known as National Shipyard and Steel Company (NASSCO) and was bought in 1964 by Baatan Shipping and Engineering Company (BASECO) which became the new name of the 52 hectare area. According to a 2002 census is home to 47 000 people or 6060 families. (www.unescap.org, 2004)

Fig 8. Map over Metro Manila (http://upload.wikipedia.org)

In the early 21st century Baseco consisted of two break water extensions into Manila Bay and was already one of the largest informal settlements. It used to be a mangrove area, but the location near the port made it attractive to workers and immigrants from both Luzon and surrounding islands. The settlers built their homes on stilts in the swampy area which gathered large amounts of garbage. The sanitary conditions were lacking to say the least and the makeshift and overcrowded shelters were prone to fires. (Interview with local government official, 2008)

In 2001 the area was acknowledged as a high priority area by the Asian Development Bank (ADB) and Pasig River Rehabilitation Commission (PRRC) for urban renewal. In 2002 it was proclaimed a socialized housing site by the president and the land was awarded to its inhabitants from the former owner Philippine Ports Authority (PPA). (www.unescap.org, 2004)

Unfortunately a series of fires struck the area in the years that followed the proclamation. The most devastating fire struck in early 2004 and left more than 2500 families homeless. The desperate situation called for emergency solutions and the local government of Manila engaged two NGOs to solve the housing situation, Gawad Kalinga (GK) and Habitat for Humanity Philippines (HfHP, 2005).

In order to create enough room to house all the families, the riverside between the two break water extensions was reclaimed with land filling material. The final result is unfortunately a very soft soil with low load bearing capacity. It is an obstacle in developing the site because it prevents the construction of heavier buildings than low-rise, where the lack of space and the amount of people in need would suggest construction of medium-rise or even high-rise buildings.

Fig 9. Even though it has not been raing for days, puddles of water can be found. It is the ground water pressing upwards.

Also, the ground is not properly sanitized and still has layers of garbage which can become a future environmental and health hazard. Although a spokesperson from HfHP claimed to have measured no subsidence in their area, groundwater can be found pressing upwards indicating that the area is sinking, and with rising sea levels the problem might worsen in the future.

This problem has been addressed though. In order to improve the environment *The Pasig River Environmental and Rehabilitation Sector Development Program* has been launched supported by the ADB. It aims to improve the environment management along a 23 kilometre stretch of both sides of Pasig River. The program includes creating a 10-metre wide environmental preservation area along the river banks, an area today inhabited by more than 10 000 families that will have to be relocated. This program includes Baseco and the river bank protection area can be found in the barangay site development plan. (Philippine-Canada LGSP, 2003)

The houses untouched by the fire have undergone some reblocking, but there are still depressed areas. Some of the reclaimed land has not yet been developed and

is slowly filling up with new squatters, making it urgent for the local government to give green-light to the NGOs to continue their work.

Fig 10. Parts of Baseco are still depressed. The foreground shows a large plot of undeveloped land and in the back the cranes in the port and high rise buildings can be seen.

Fig 11. The barangay meeting hall is one of the few medium rise buildings in Baseco. It is built close to the original pier where there is enough load bearing capacity.

Fig 12. Part of Baseco has been reblocked. In the background a mosque for the muslim community can be seen.

6 The NGOs Gawad Kalinga and Habitat for Humanity

Shelter is a basic need for everyone. It provides so much more than just a roof over the head, it gives a starting point for people who have lost everything. After the last fire in Baseco, two non-governmental organizations, *Gawad Kalinga* and *Habitat for Humanity* were engaged, two organizations with the primary objective of improving the housing situation for the poor, something desperately needed there.

6.1 Gawad Kalinga

Gawad Kalinga, GK, is a Philippine organization mainly run by volunteers. Gawad Kalinga means "to give care" or "an award for caring". They are building low cost houses for the poorest of the poor.
(http://www.gawadkalinga.org/whatisgk.htm)

The catholic organization, Couples for Christ, conducted a youth camp in 1995. The camp was 3 days long and the participants were notorious gang members from Bagong Silang, one of the biggest slums in Metro Manila. It turned out well, and more activities were planned, such as theatre, sports, livelihood training and scholarships. This went on for five years, and as long as the youth were activated they were behaving. But the team realized that the youths had a very slim chance to succeed unless their whole community was transformed. Therefore, a holistic approach with shelter, child & youth development, health and livelihood programs was set up. This was the beginning of Gawad Kalinga's key programs. President Gloria Macapagal-Arroyo was very impressed, and donated 30 million pesos (4 611 000 SEK) and Gawad Kalinga became an official organization in 2003.

The vision of GK is a slum-free and squatter-free nation. Their aim is to provide dignity and peace for every Filipino with *land for the landless, homes for the homeless, food for the hungry*. They see the problem of poverty as "huge but not without end" and "since it is man-made, it can also be man-Unmade". The same year as they became an official organization, the set up a goal of building 700,000 homes, in 7,000 communities in 7 years. So far they have built approximately 900 communities. (www.gawadkalinga.org, 2008)

GK genreally constructs houses that are 1 – 2 storeys high, either row-houses or single detached. They are uniform and no personal exterior alterations are allowed to encourage the notion that everybody is equal. The houses are complete at the time for moving in and painted in typical, bright colours representing hope, making any GK village clearly recognizable. The beneficiaries need to add their own inner walls, floor finishing and ceiling.

Fig 13. A GK village in Taguig with two-storey buildings and painted in the NGO's distinguishing colour scheme.

GKs resources come from donations from private persons, companies and institutions. The government usually donates the site and provide for the drainage system while the private sector donate money. This covers the material costs of the houses and the construction work is done by the residents themselves under the head of a site manager.

Fig 14. Gawad Kalinga Villages are often named after their sponsors. In this case it's the Bureau of Customs.

The local government usually provides GK with a list of families who have applied for a house and meets the requirement of being the poorest of the poor. These are the people who are eligible to get a house "for free" and become a Gawad Kalinga *beneficiary*. Instead of paying a monetary fee, they pay with *sweat equity*, which means that they have to complete a number of working hours on the site. The price the residents pay for a house in Baseco is 1 200 hours of work per family. The families are allowed to move in before the hours of work are done, but they don't become the official owners of the house until they have completed the hours. (Interview with Jaja Oquiñ, 2008-03-28)

6.2 Habitat for Humanity

Habitat for Humanity, HfH, is an international, ecumenical Christian organisation, founded in USA in 1976. They strive to "eliminate poverty housing and homelessness from the world, and to make decent shelter a matter of conscience and action". HfH have affiliates in 92 countries and have up to this date built 225 000 houses around the world. (www.habitat.org, 2008)

Families who need decent shelter apply to the local affiliates of Habitat for Humanity to become *home partners*. They are chosen on basis of their needs, their willingness to partner with HfH and their ability to pay off the mortgage. The houses are sold with no profit and with no interest charged on the mortgage.

The cost of the houses is kept low by

Fig 15. A project by HfH in Manila where the original lots have been reblocked and the houses have been adjusted to suit the location.

using cheap materials combined with volunteer labor and *sweat equity*. The funding constitutes of donated money as well as the mortgages paid by their previous home partners according to the principle that they aren't in fact paying for their own house but for the next family to have the same opportunity.

HfH builds simple houses with locally appropriate materials. The design of a HfH-house must be easy to build – volunteer friendly – to allow un-skilled workers to assist. In the Philippines they mainly use two building systems. One system uses interlocking concrete blocks, manufactured on site and bricked as a normal masonry wall but without mortar, where the blocks interlock with each other instead. The other system uses a lightweight steel frame, assembled on site and covered with cement fiber boards. (Interview with Manuel S. Zeta 2008-03-31)

Fig 16. Medium-rise buildings by HfH in Taguig built with interlocking concrete blocks. Lofts can be installed in all condominiums, making the houses taller than normal three storey buildings.

Fig 17. A model interior from the HfH houses in Taguig that perhaps is more beautiful than affordable but contributed to reduce the residents reluctance against medium rise buildings.

7 Observations in Baseco

Visiting the Gawad Kalinga and Habitat for Humanity area in Baseco was a surprise in a good way. We visited Baseco on several occasions in March and April, the height of the hot and dry season and made our structured interviews on a Saturday to catch the residents when they were off work. The residents seemed pleased and hopeful about their situation; they were friendly and happy to show us their new homes. The difference from the surrounding slum was notable and the NGO's are to be credited for an important work by successfully providing affordable and well made housing solutions for underprivileged people.

Even though Baseco is a very poor area, and the economical resources are limited, both organizations have succeeded in making it beautiful. The rows of houses are neatly organized, painted in bright colours and surrounded by trees,

flowerbeds and paved walkways. When you enter the developed part of Baseco as a tourist it is hard to realize that the smiling inhabitants are among the absolute poorest of people. Stepping behind the façade, you can still see a lot of misery though.

The living space is 20-24 m^2 and is very small for an average family in Baseco, and the backyard becomes an extension of the house and the result leaves

Fig 18. The backyard, narrow and cluttered, is used for cooking, washing, laundry and storage.

a lot more to wish for with laundry, piles of stored items and dirty water gathering in puddles. Inner walls and loft are set up without any consideration of either ventilation or daylight and the sanitation is in many cases terrible. The

houses have some similar problems and advantages. We have identified them by interviews and observations in the area combined with our knowledge from the education and written sources. But despite its shortcomings the houses are an important part of giving hope and human dignity to people who might have lost faith in a better future.

Fig 19. When the house is both small and hot, the street becomes an extension of the living room.

7.1 Houses by Gawad Kalinga

GK usually start with building temporary shelters while the work for more sustainable houses is in progress. But the need for new houses was so dire in Baseco after the devastating fire in 2004 that they began with the permanent houses directly. These houses are expected to be suitable for living for about 20 years if they are maintained well. A house built by GK costs in general about 75 000 PHP (11 610 SEK). The cost for a house in Baseco was 50 000 PHP (7 740 SEK) at the time it was built.

The houses in Baseco are only one storey high. They are organized as row-houses of 8 homes. Four rows of houses constitute a neighborhood with an elected leader and spokesman. Donating companies, or partners, as GK calls

them, donate the equivalence of a complete house or a row of houses, but every 25th house donated is instead transformed to site improvements such as pavement and planting, making the area nicely furnished.

The separating walls between the row houses are made of hollow-blocks and the façades are steel frames behind cement fiber boards. The roof is a gable roof made of corrugated steel-sheet. The houses are all equipped with the same type of wooden doors and louver windows. (Interview with Jaja Oquiñ 2008-03-28)

7.2 Houses by Habitat for Humanity

The houses in Baseco made by HfH are just as with GK, row-houses with rows consisting of eight houses. They all have mono-pitched roofs. There are two different designs: The standard house is 1-storey with possibilities for a loft. The other alternative is a 2-storey house where the first floor is planned to be used for commercial activities to bring livelihood to the area. There are different types businesses already running such as shops, beauty centre and maternity ward.

Fig 20. A HfH commercial/residential building.

The material cost for the standard, 1-storey house, in Baseco is 40 000 PHP (6 164 SEK) and the commercial, 2-storey house, is 65 000 PHP (10 016 SEK). The price that the residents pay for the standard house is 516 PHP (80 SEK) a month for 5 years. The same number for the commercial 2-storey houses is 1050 PHP (162 SEK). Additional to the monthly fee, the residents have to contribute with manual labour or *sweat equity* of 600 hours.

As all houses designed by HfH, the houses in Baseco are volunteer friendly. The frame is made of steel, a technology imported from New Zeeland, based on a computer generated model. The metal bars arrive in numbered bundles and are assembled on the ground into panels and then erected. The metal frame is then covered with cement fibre boards which resistant to fire and termite. The cement

fibre boards are 4.5 mm thick. There is a suggestion to use 6 mm instead, because the boards break easily. Improvements with hollow blocks are allowed only on the ground floor, due to unstable ground.

Roofing sheets are made of galvanized aluminium, which has a higher durability, resists rust and emits less heat radiation compared to corrugated steel sheets. The aluminium sheets that are used are second standard, although still adequate and for which they pay a lower price. The houses are also painted in bright colours, although not as striking as GK. In Baseco the houses are mainly green or orange. When the houses are ready to be delivered to the owners, it consists of a floor, four walls and a roof. There are no windows, doors, inner walls or any loft, this is up to the owners to buy or construct themselves when they have the time and the money. The life expectancy for the houses in Baseco is estimated to be 25 years. (Interview with Manuel S. Zeta, 2008-03-31)

8 Interviewing the Residents of Baseco

We engaged in twelve interviews with the residents of Baseco, six in the GK Village and six in the HFHP area. Four interviews that we consider typical are presented further on. To our aid we had Faith Varona from the NGO Technical Assistance and Organization (TAO Pilipinas) who helped with interpretation. We went to Baseco during the weekend to find as many residents present as possible. Ms Varona also helped us finding suitable families. We wanted a broad range of families and hade the possibility to interview smaller ones with 4-5 persons and large ones with eight or more as well as families who had lived there from the start to those who recently moved in.

We had prepared questions in advance. The questions were both social ones like the number of family members and what sort of income they had as well as more technical ones like what kind of improvements the wished to make on the house and if there was any problems. The interviews went smoothly and it's our impression that, despite language difficulties and our presence as strangers, no one was reluctant to give us straight and honest answers although some of our questions weren't understood the way we intended. Since we were trying to compare GK and HfHP we asked which area they preferred if they only looked at the technical aspects and the design. The response was always that they preferred their own home or in some cases GK, because it's for free. The conclusion we drew was that the residents feel a strong sense of loyalty towards the organization that provided their home and that the economic aspect was hard to exclude. There was no distinction between their house and their home, which made an objective comparison difficult. Despite this some relevant conclusions could be drawn from the interviews.

The interviews showed small differences in opinions between GK and HfHP. They had similar complaints, although both sides were very happy with their new homes and emphasized that their lives had been improved. The common complaints were lack of space, high indoor temperature and poor ventilation. They all shared the same wish for improvements which included adding a loft,

ceiling and improved flooring. These improvements could be found among those who had had enough time and resources. Kitchen and bathroom could be problematic in the HfHP area when the residents were in the process of moving its location to the backside. Maintenance of the plumbing system was also an issue in both areas. Some residents desired single detached houses, separate kitchen and living room but mostly the plans for the future involved seeing their children through school rather than making larger improvements on their houses.

Fiq 21. It is important to consider livelihood when planning an area. This woman with a sari-sari store in her home.

8.1.1 Family A

This family in the GK area has four children. The husband is a dockworker and the wife has a *sari-sari* store in the house. That is tagalong for a mini-store specializing in single service packages of supplies and snacks. They have used the small space to the maximum, with the mini-store taking up a large part of the twenty square meter house. Still they have managed to add a bedroom for the parents and a loft, sleeping area for the four boys. Walls, loft, furniture and cluttered shelves leaves the small house dark, hot and humid. Like so many others the parents' wish a larger house, although their primary concern is seeing their children through school.

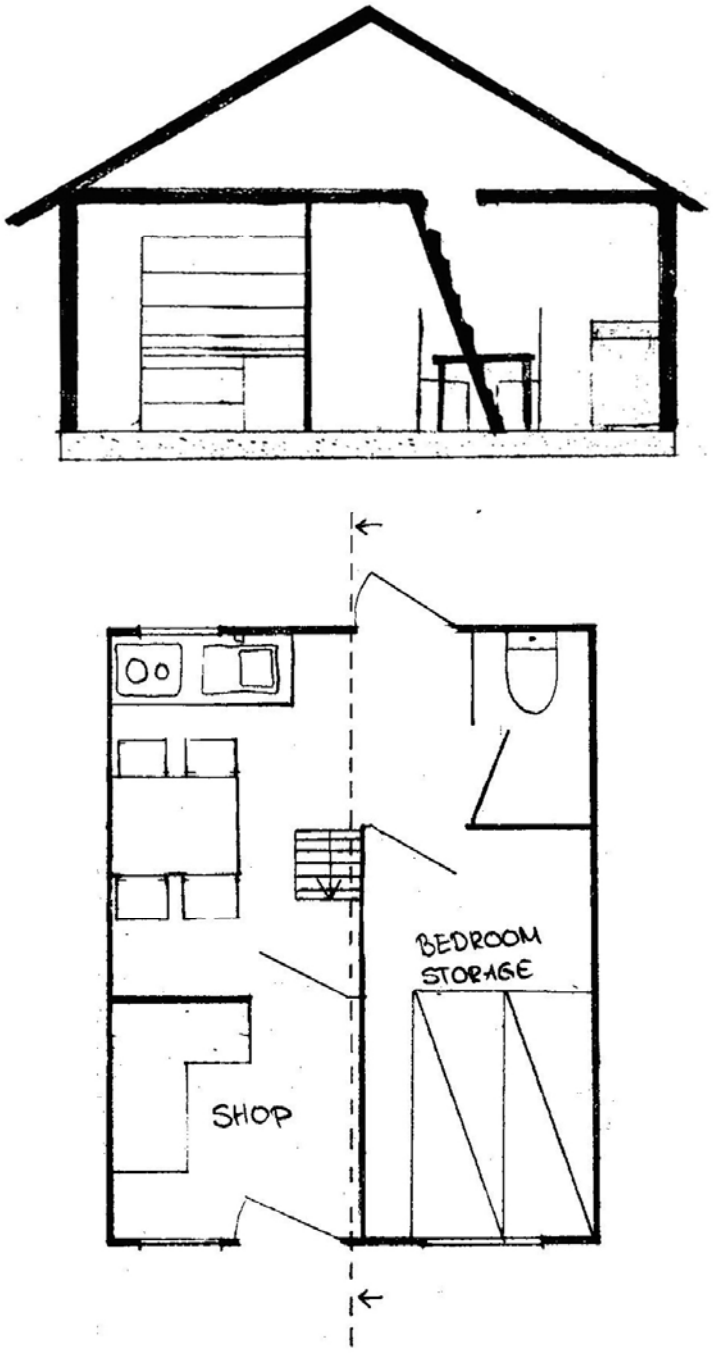
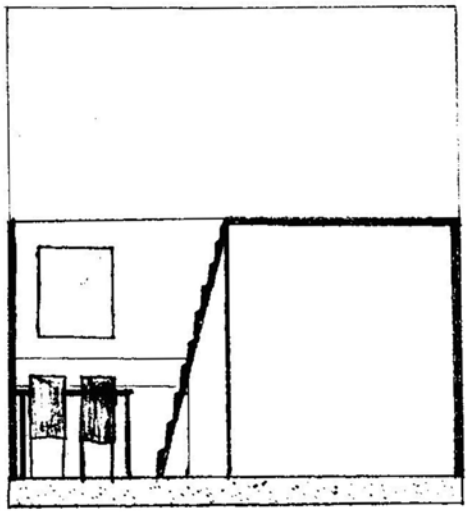
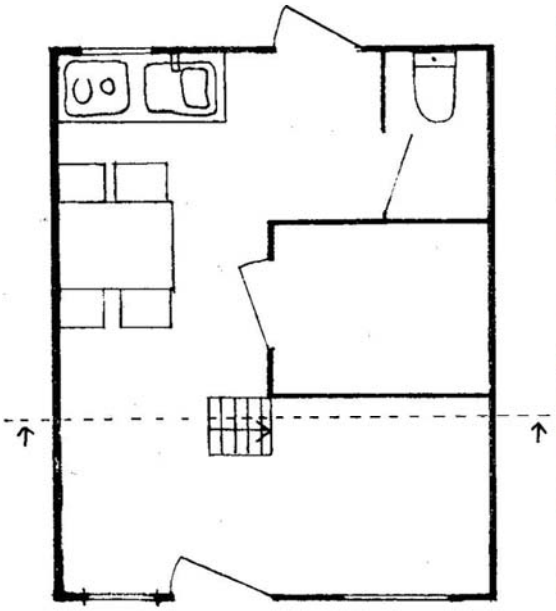


Fig 22. Section and plan over family A's house.

8.1.2 Family B

Family B is another typical Baseco family in GK with five children and the father working in the docks. Their GK house is neatly furnished and is being used as a model house for visitors. They think that the indoor climate is ok, but would have liked a full second floor. Still they prefer the peace and quiet of Gawad Kalingas area.





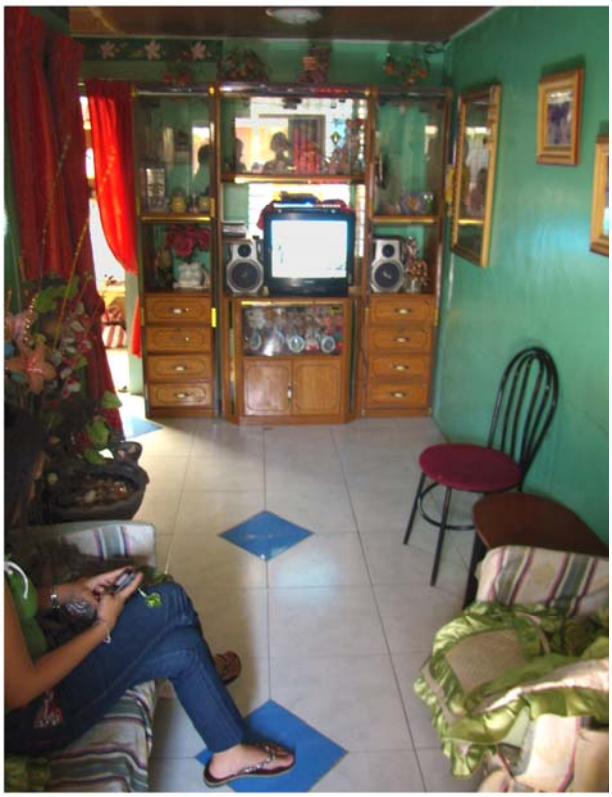


Fig 23 (above and left) Section and plane over family B's house

Fig 24. (right)The GK model house nicely furnished with tiled floor. Notice the TV and DVD-player in back, the gathering spot for friends and family to enjoy videoke, a popular entertainment throughout the Philippines.

8.1.3 Family C

The family's old house burned down before the great fire of 2004 and they spent four years in a 16m^2 nipa hut until they had the chance to become home partners with HfH in 2007. The husband works as a dockworker and the wife is at home pregnant with their 10th child. *No more eating, but happy,* the husband says and laughs heartily, but it is clear that the catholic resistance against artificial birth control has strained the family's resources. The dinner table can only fit eight people so they can never enjoy a meal with the entire family sitting down at the same time. Their new house is clearly an improvement from their previous shelter and all the children have a place to sleep. The boys in the family sleep downstairs and six family members sleep on the loft. The wind passes through the house and the indoor climate endurable, but their location close to a gravel road makes it dusty during the dry season.

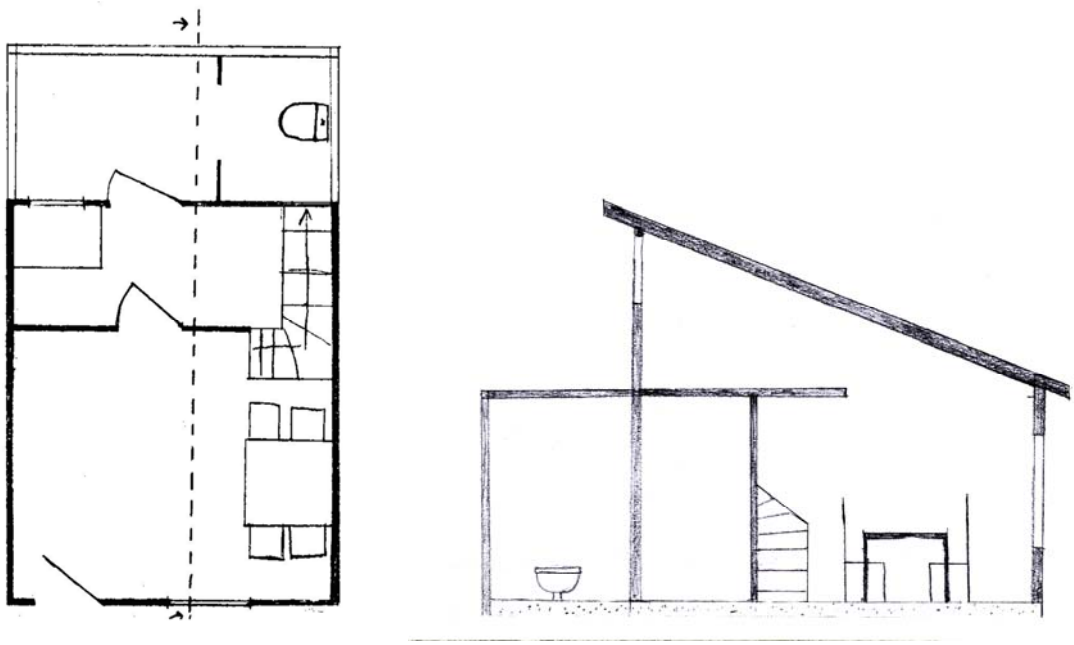


Fig 25. Section and plane over family C's house.

Fig 26. "No more eating, but happy" says the father in the family with a laugh.

8.1.4 Family D

This family consists of a single mother and her four children age 4-12. She sells vegetables outside the house and earns PhP 200/day (30 SEK). When she goes on her selling rounds the children stay at home and guard the house. The moved in quite recently and have not had the time or finances to improve their house. The HfH houses are delivered without windows and to prevent rain from coming in, the windows on the not-yet-added loft have been barred, reducing the daylight and ventilation indoors. The backdoor and windows was lso barred for security reasons as they hade experienced some of their kitchen utilities being stolen. She originally desired a house in the GK area but the list of beneficiaries was already full.

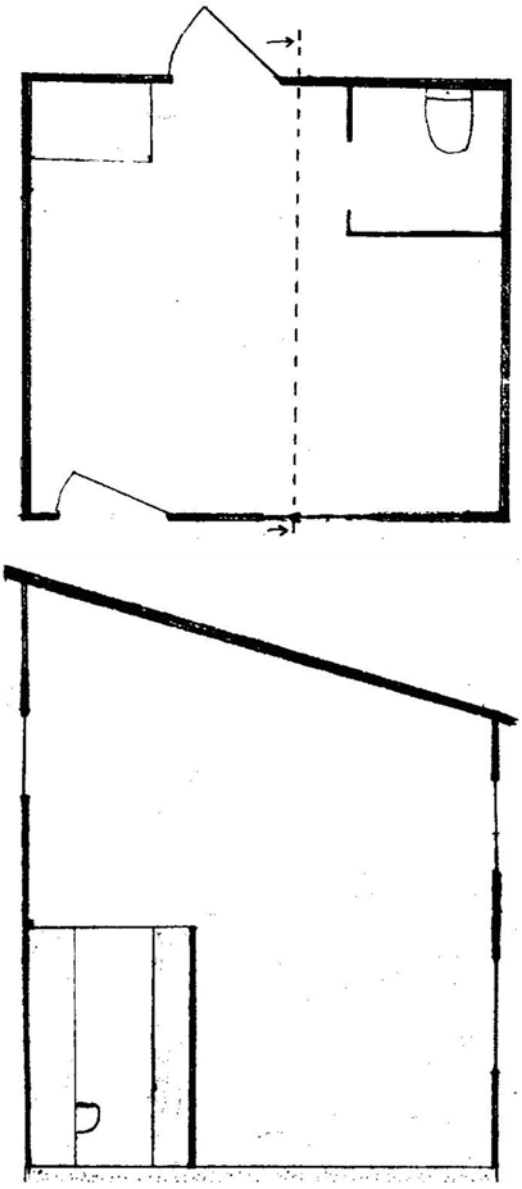


Fig 27. Section and plan over family D's house

Fig 28. When the HfH houses are awarded they consist of just four walls and a roof. This shows the original toilet which later has been moved to the backside by most residents. The windows on top floor have been barred to prevent rain and on the backside of the bottom floor to prevent thievery. Notice the tiled floor made from scrap stone and ceramic tiles, an artistic solution which is both inexpensive and environmental friendly.

9 Comparison

In this part the houses of Gawad Kalinga and Habitat for Humanity will be compared with respect to construction and technology.

9.1 Drainage and foundation

It is very important that the surface water is drained away from the building to avoid problems with moisture and in worst case flooded floors. If the soil is not well-drained and the ground water can be transported by capillary suction, the house has to be placed on a gravel-bed or have a ventilated crawl space. A minimum fraction of 8mm is recommended.

The ground should be cleared from all organic materials when preparing the foundation. The base of the house should be at least 300 mm high to minimize rising water to splash on the walls. This is specially important in lowland areas with heavy rains.

In areas with heavy rain there are no use for roof gutters since they will overflow during the rainy season. The drainage system around the house must therefor be reliable. The house should preferably be placed on a height, with a gradient of at least 1:10. The ground nearest around the house should be covered with hard material (concrete or stones), which will drain away the water from the house. The water can be led away from the house through gutters into ditches. (Adamson and Åberg, 1993)

9.1.1 In Baseco

Drainage is an overall problem in Baseco for several reasons. It is situated close to the Pasig River which sometimes floods. The reclaimed area is also slowly sinking, pushing groundwater up to the surface. One should also consider the scenario with rising sealevels in the future.

In the GK area the roads are paved and there is an existing drainage system. However, the base of the houses is raised only in a few blocks, an extra feature donated by one of their partners. The houses that lack this feature suffers the risk of flooding during heavy rains. Deeper gutters for draining would be advisable, especially in the backyard which also is used as storage.

The HfH area has still a need for improved site development, and many roads are still unpaved and will turn into mud during the rainy season. The monopitched roof leads the rain towards the front where there is a need for deeper gutters in the front. The foundation needs to be raised to avoid flooded floors and also to pave the area close to the walls to avoid splashing of muddy water.

Fig 29. This HfH building shows the foundations lack of elevation

Floor

Ground constructions are usually made of concrete protected from cracking with reinforcement. The level of the floor should be at least 150 mm above the surrounding ground to avoid problems with moisture. In areas with extremley heavy rains, the height of the floor should be at least 300 mm.

Common finishing for concreet floors are tiles (ceramic, terazzo, concrete or natural stone), burnt clay, gluing plastic (vinyl) or linoleum. Plastic covering should not be used in warm humid climate due to the moistproblems.

To design concrete floors for earthquakes and cyclones, they should be well fixed to the foundation. (Åstrand, 1994)

9.1.2 In Baseco

In Baseco different solutions to the flooring could be found. Lack of time and/or resources had left some of the floors yet unfished with perhaps only cardboars sheets to cover the concrete. Plastic floors could be found in a couple of houses, which is not recommendable, although some of these floors were not glued and therefor not as problematic. Tiled floors could be found among the residents who have had the time and resources to do so. One family had a beautifully tiled floor using scrap ceramics and stones, which combined both artistic creativity and sustainable, environment friendly solution.

9.2 Walls

Walls need to be constructed with consideration to many factors. They need be durable against the climate and natural disasters and they need to be affordable. The choice of building materials in walls has been discussed in chapter 4.

Traditional buildings in hot climate usually have high ceiling. However, this gives no advantage in reducing the temperature. It is found that a significant reduction of the room height (from 3.6 m to 2.4 m) in hot climate only gave a very small temperature increase. Therefore it is better to lower the ceiling height and save material costs, and insulate the roof or do a ventilated ceiling instead. (H. Rosenlund, 2000).

The colour of the outer walls should be white or a light colour in order to reduce the solar absorption. But it is hard for white walls to remain white in a tropical climate because mould and algae discolour them if they are wet. (Adamson and Åberg, 1993)

9.2.1 In Baseco

The walls in Baseco were constructed in basically the same way in both areas, with a metal frame and cement fibre boards, partly improved with concrete hollow blocks and painted in bright colours.

Fig 30. Flowerbeds close to the façade of a GK house.

Gawad Kalinga uses concrete hollow blocks between the houses, making it more soundproof. The façades are supposed to be maintained and repainted on a regular basis, although this did not seem to be implemented consistently. It must be said that the walls were not in an immediate need of renovation, though. The GK village also has a problem with raised flowerbeds placed by outside wall making it exposed to moisture at all time.

Habitat for Humanity has in Baseco used a steel frame system, bought from a local manufacturer and assembled on site. The frames are then covered with fibercement boards. The boards being used today are unfortunaely very brittle and although easy to replace it might not be the residents highest priority and it is a risk that the replaced and newlypainted panels will make the façade look. We strongly support the suggestion of using a thicker board.

Fig 31. A crack in the wall of a HfH house shows how brittle the cement fiber boards used here are.

One problem with the steelframes used were that they were not compatible with the standard size of concrete hollow blocks, which a lot of the families wishes to use to improve their homes. They are allowed to use hollow blocks only on the ground floor because of the weight. Other problems are that the walls become dirty from splashing, muddy water and provide poor sound insulation.

Room heigt was adequate in both areas, but as has been pointed out earlier, Gawad Kalingas design does not support a loft and the adding of this lowers the room height to a level where it has an impact on light and circulation. Our suggestion is to always plan for this feature either by having two storeys or with an inreased room height.

9.3 Doors and windows

The purpose of doors and windows are communication with the outside and deliver daylight and ventilation. (Åstrand, 1994)

The frames of the doors and windows can be made of several materials - wood, steel, aluminum and plastic. Aluminum is preferred in passive houses in warm-humid climates because they are easy to maintain. They also have advantages when it comes to termites and deterioration by UV-radiance. Louvre windows are used to provide ventilation and direct the air flow. (Adamson and Åberg, 1993)

Windows can be a entry for burglars and througout the Philippines protective metal bars covering the windows can be found. These bars are sometimes very decorative.

9.3.1 In Baseco

In both areas the use of wooden doors and louver windows was the most common. The biggest difference between GK and HfH when it comes to doors and windows is that in GK they are inlcuded in the house and in HfH the residents have to provide their own windows and doors. Therefore, every resident in GK had adequate windows and doors. In the HfH area the need to provide your own windows and doors has produced various results ranging from beautifully decorated and personalized doors to windows that were temporarily completely barred due to lack of funds and thereby provided no ventilation or daylight.

Fig 32. Louver windows give good airflow.

In both areas the windows and doors on the backside proved problematic. As the residents wanted to expand their homes they tended to build constructions which gradually covered up doors and windows. The narrow backyard between the rows of houses becomes more cramped, hindering both wind and daylight. It is also obvious that Gawad Kalinga intended their houses to be without a loft, because there are no windows or ventilating openings close to the roof. It is reasonable to anticipate that the residents will add a loft though.

9.4 Roof

Water protection is the most important quality of the roof. A pitched roof is therefor recommended since flat roof normally leaks, or will leak within a few years. With a roof overhang of 800 mm, the walls will remain dry from rain, and make it less prone to mould and algae. The roof overhang will also shade the windows from direct sun light. (Adamson and Åberg, 1993) The roof overhang is vulnerable to strong winds and a length of more than 800mm is not advisable in areas prone to cyclones. It is very important that the roofing material is securly attached to the battens and that the rafters are secured to the walls. Sometimes, in areas with very strong winds, that is not enough, and the rafter have to be attached to the ground as well.

Wind has the least effect of the roof with a slope of 30 – 40º. The most common design for the roofs is gable roof. An alternative to this is hipped roof. The advantage with this design is that it protects all the four walls from the weather with the roof overhang. But it is alot more difficult to construct and it makes it hader to provide an adequate ventilation. Monopitch roof is an other method. Three out of four walls are relatively unprotected to the weather, though. Flat roofs are not recomended in areas with heavy rain, because they are more likely to leak.

The most commonly used roofmaterial in developing countries are corrugated iron sheets (CIS). It is relatively cheep and is easy to transport. It does not require skilful workers to set a CIS roof and it is fireproof. The disadvantages are that it requires a lot of maintenance, like painting, to prevent rust especially in marine climates with salty air. The metal gets very hot in the sun and produces a lot of noice when hit by rain. (Åstrand, 1994)

To make the roof as little heat gaining as possible is very important. This is done by painting the roof in white or light colours. To minimize the heat radiation from the roof to the room inside, the roof should be either insulated or ventilated. (Adamson and Åberg, 1993) To add a ceiling is a way of insulation that is easy and affordable to construct. It will prevent heat-emission from the roof and also reduce the sound of heavy raining. There are some disadvantages, though. Insects, bats and birds like the space between the roof and the ceiling, specially if it is dark and moisty. Their excrement may cause bad smell and bad hygenical conditions. Therefore, it is very important to put up a net which keeps the uninvited guests away.

9.4.1 In Baseco

Roof and roof design was problematic in Baseco. Both housing types used some sort of corrugated metal sheets without ventilation or insulation. GK used corrugated steel sheets and HfHP used aluminium sheets which are somewhat better emitting less heat and being more durable. The overhang was lacking in

both and there was complaints about water leaking in during heavy rains, when the wind pushed the sheets upward.

Gawad Kalinga has chosen a gable roof design that leads water to the backyard. HfHP has a monopitched roof that leads rainwater away fom the backyard. Many roofs were painted in a dark colour, which buffers heat.

Ceilings were only added by the residents in some houses and the difference in indoor thermal comfort was notable. This did not prevent some residents from believing that adding a ceiling would *increase* the indoor heat, which is an understandable opinion if not informed about the physics of heat transmission and absorbtion.

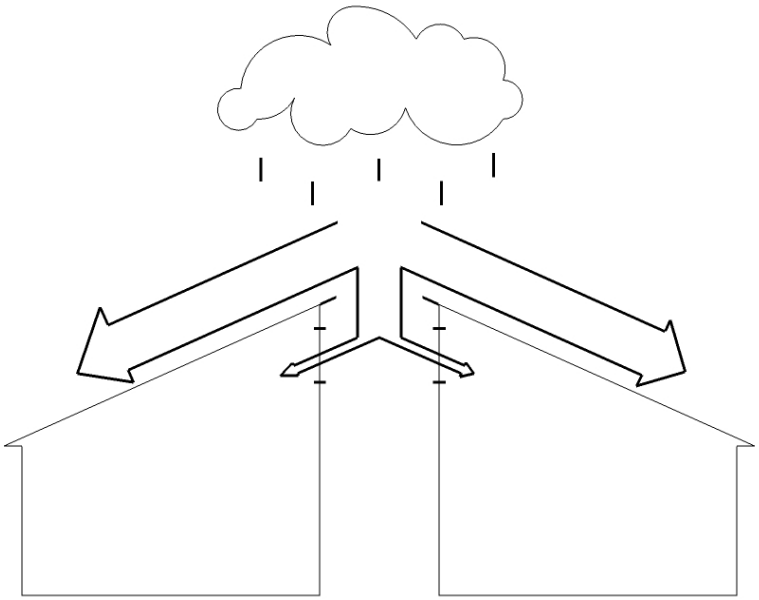


Fig 33. The roof design and orientation of the HfH houses, which leads most rain to the front side instead of the narrow backyard, but has a problem with unshielded windows on the loft.

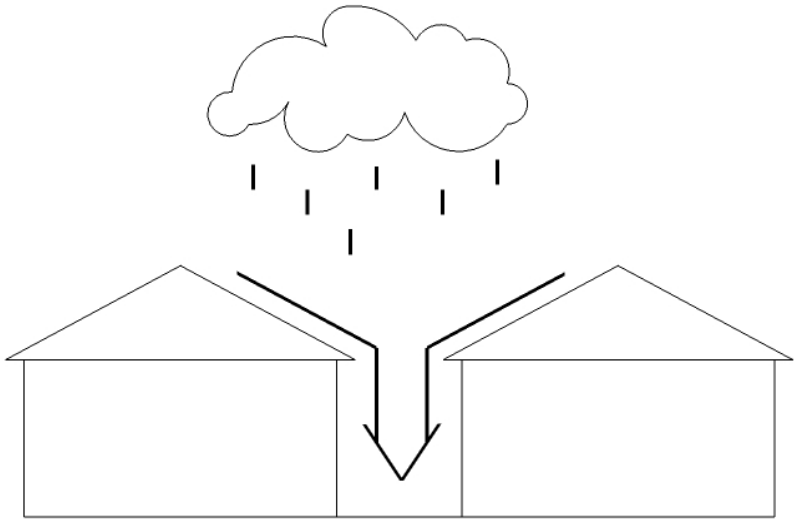


Fig 34. The roof design and orientation of the GK houses which leads water to the backyard.

9.5 Space

Adequate shelter means a lot more than just a roof over one's head. There are many factors that together decide if a home can be categorized as adequate. The space is one of those factors. It varies from country to country since it depends on the culture, social, environmental and economic aspects. (www.unhabitat.org, 2008)

The Swedish standard says that you are living in confined quarters if each member has less than one room each, excluding kitchen and livingroom. (www.boverket.se, 2008)

9.5.1 Baseco

The Swedish standard is, of course, not applicable in the Philippines. It was mentioned above just to give an idea about the differences between the countries. However, the space, or the lack of it, was one of the main issues in Baseco. To call it compact living is a cruel joke.

An average family consisted of at least 5 persons (according to our observations). This gave each person maximum personal space of four to five square meters, depending on what house they lived in. lThe very large families would have even less than that. They were not able to either eat or sleep at the same time but had to take shifts and, if there was the possibility, they chose to stay at a friends place.

Fig 35. A loft constructed in a GK house shows how dark and cramped it could be. The electrical fan is necessary since there are no windows.

The houses by GK are 20 m² and by HfH 24 m². A big difference between those houses is that the owners of a house by HfH are allowed to make personal alterations on the outside. It is common that the owners extend the houses and place the kitchen and toilet outside, on the backyard. This can give the houses a personal stamp and some characteristic, but most importantly allows the residents to increase their living space. But, it might also cover the window and prevent the airflow and make the backyards look less attractive. GK, on the other hand, do not allow any exterior personal alterations, which although avoids poor solutions also limits the familys possibility to increase their living space.

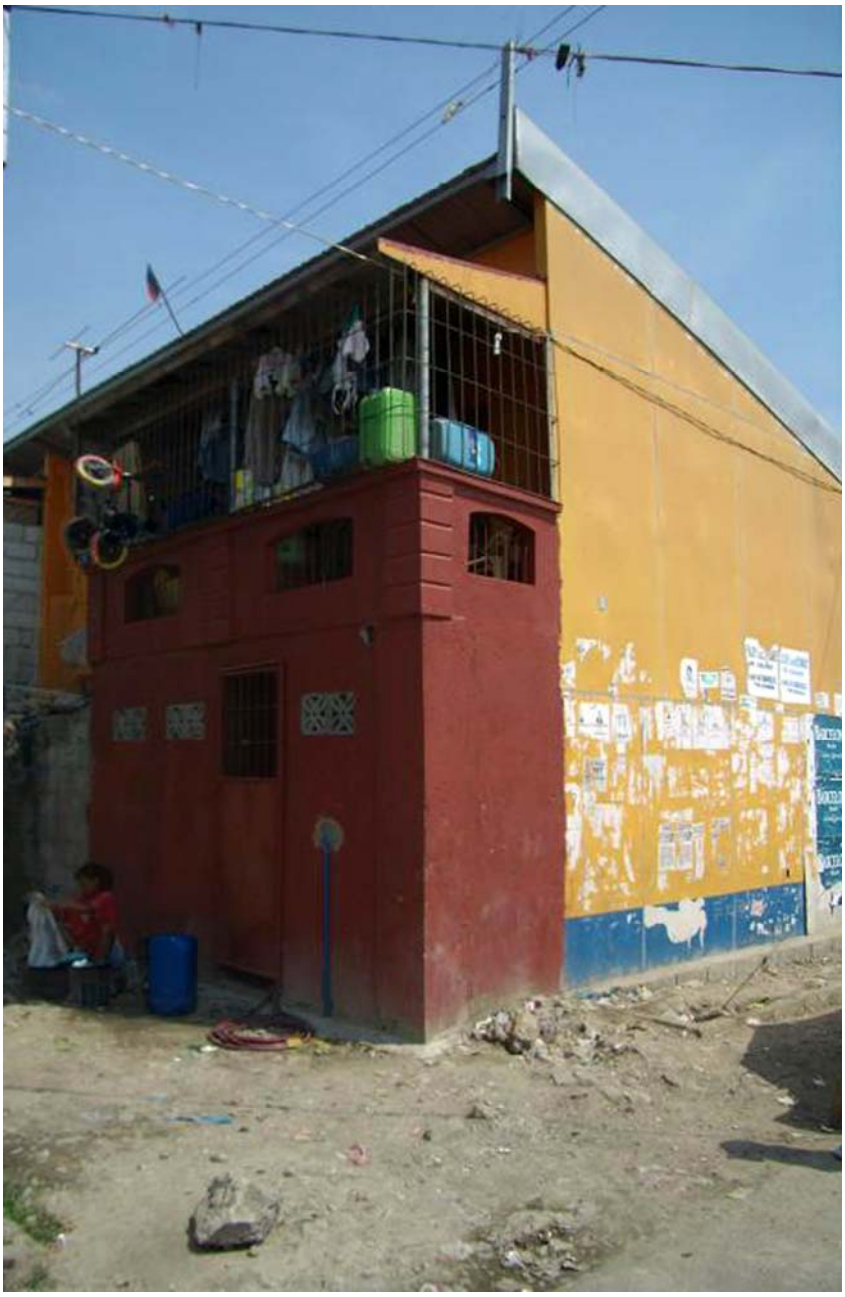


Fig 36. This HfH family has extended their house to the maximum

9.6 Water and Sanitation

Nearly half of the world population lack basic sanitation facilities and over one billion people still use unsafe drinking water sources. This is a major issue, especially in developing countries where millions of people suffer needlessly from diseases caused by inadequate access to safe water and sanitation. Even more important than adequate water and sanitation is the knowledge of correct use of those facilities. If people have the information they need, they will be able to protect themselves from diarrhoeal disease and other infections that can be caused by unsafe water and sanitation. (www.unicef.org)

Therefore, water and sanitation combined with knowledge about their importance are key factors. It is also very important to keep the water and sanitation systems well maintained. Water systems that break down force people back to unprotected sources. Sanitation facilities that are not properly maintained will also allow pathogens, which are agents that cause disease, back to the environment. (www.mvula.co.za)

The three chambered septic tank is the most common sewage system for smaller volumes. It is the best and the simplest for water-borne sanitation. To work as desired, it is dimensioned with a total volume of at least 2000 litres. Each consumer requires about 200 litres. When the water has gone through the sedimentation in the chambers of the septic tank, it flows to a soakaway to be absorbed by the soil. (Åstrand, 1994)

9.6.1 Baseco

The sanitation situation in Baseco has space for improvements. The hygiene where taken care of at the back yard together with cooking. People were washing themeselves and doing the laundry next to food preparations. The families, who had water, used a septic tank for the refuses.

GK provides different programs for the house

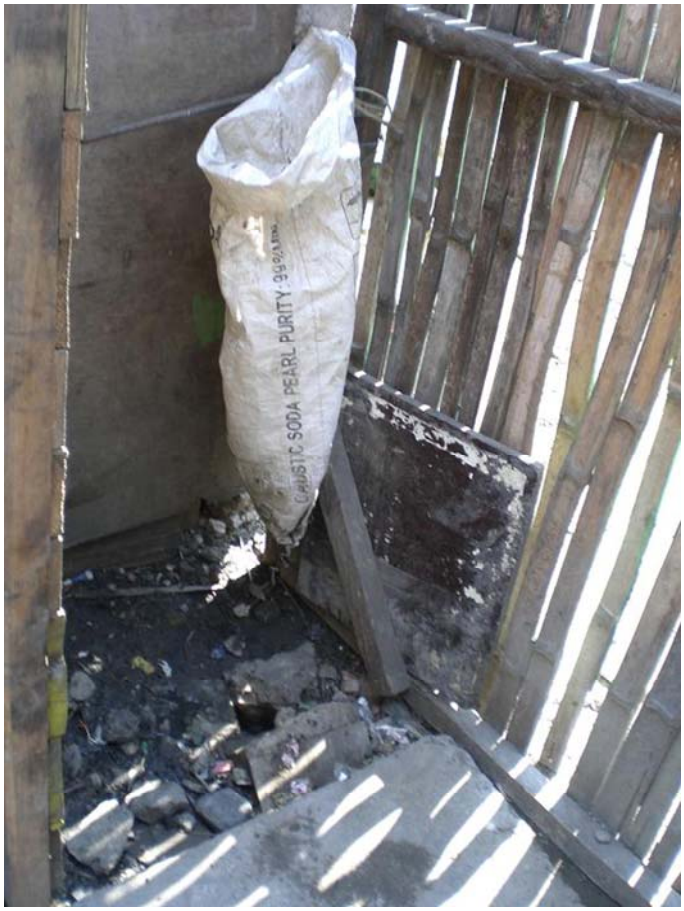


Fig 37. This family is in the process of moving their toilet to the backside of the house. In the mean time this hole in the ground is used as a urinal while faeces is simply wrapped in and thrown in the garbage.

owners. One of the programs is named LUSOG, which means healthy in Filipino. Every GK community is monitored by a volunteer team of doctors and paramedical practitioners who bring up questions like hygiene and other health care issues. The fact that the GK residents were not allowed to move their toilets from their original place also contributed to more sanitary condition.

In the HfH area the toilets were in some cases unhygienic, especially if the family was in the process of moving it to the outside. Also, when toilets and kitchens had been moved out to the back, they were often only separated with a curtain and sometimes with nothing at all.

9.7 Outdoor environment

Shading and ventilation are the most important factors for comfort in warm-humid climates. It is essential for the buildings to have the right placement and space to allow the wind to flow. The surrounding vegetation offers solar shading and wind deflection. Protection from strong winds is important in areas prone to typhoons. (H. Rosenlund, 2000). Also, greenery contributes to a fresher air and a more beautiful environment.

When it comes to low budget houses in developing countries, beauty is not the aspect that people usually to see as an issue. However, it is more important than most people expect. If a house is beautiful, the owner tend to maintain it better. It also makes you want to preserve it, even after the original function is no longer usable. (Att bygga i u-land, s. 7).

9.7.1 In Baseco

Of the trees of the old mangrove area which Baseco used to be is nothing left. The mangroves would otherwise have given som protection against typhoons and strong ocean winds. But in the polluted city of Manila the sea breeze felt very refreshing in the heat. On an overall view, Baseco still lacks any larger green area. On the other hand Gawad Kalinga, and to some extent HfH has done a great job here. In GK, a lot of space has been reserved for plants and trees. Also when it comes to beauty, the GK area feels very welcoming and pretty, with the houses painted in bright colours, the streets paved and flowers planted.

Fig 38. In every end of the rows of houses in the GK area, small gardens can be found.

In Habitat for Humanity's area the efforts on the outdoor environment have so far been more sporadic mainly because they are waiting for the local government to fix the roads. When it comes to the facades there is room for more personal improvements than in the GK area. It creates a beautiful diversity, but may also result in some homes that are left untended and with poor design.

Fig 39. In the areas whith plants and awnings the HfH houses are barely visible.

9.8 Natural Disasters

Baseco is a former mangrove area, which gave the area a very good wind hindrance. Since the mangroves are gone, the area is hit by the strong winds during the typhoons. However, the houses in Baseco stand natural disasters like earth-quakes and typhoons very well. Since they are only one or two storeys they do not suffer as much as other buildings in the city. The construction method of steel-frames also makes them more resistant and flexible. The worst scenario that has happened since the houses were built four years ago is that a few roofs have blown away.

10 Housing Suggestions

In Baseco there are clear limitations on how to build. It has to be low-cost housing as a lot of the people living here are among the poorest in the Philippines. There is also a very high density of people and a constant struggle between awarding everyone a decent lot size and actually finding room for everyone. Unfortunately, because of the soft soil, building high-rise or even medium-rise buildings is not an option as it would be too expensive. Therefore, we have worked with basically the same design as both GK and HfHP has used, low rise row house models with a steel frame construction and metal sheet roof and have worked to find some improvements.

Our main objective was to eliminate the major problems identified in both areas; space, heat and ventilation. Space has been increased by using larger lot sizes and larger basic structure. Like HfH, the houses are also planned for a loft or a second floor. To increase the indoor comfort, windows are placed to promote cross draught and with consideration to future indoor walls. We also wish to reduce the heat emission from the roof and therefore chooses the aluminium sheets used by HfH, although we recommend the resident to add a ceiling as well.

The first floor will be made from concrete hollow blocks, like in GK, where the separating walls are made of it to make them more soundproof. Louver windows found in both areas also seemed to be a good alternative and we believe, just like GK, that it should be included when the house is awarded.

We also approve of the GK rigid rule of not allowing the bathroom to be moved, because the result of moving them was not always successful. However, we do not necessarily believe that the residents should be prohibited from making their own personal improvements –these were in many cases very beautiful, there should be some limitations on what they are allowed to do, in order to maintain a functional construction.

From the GK area we were also inspired to use different colours on the houses, and to set aside space for trees and planting. The orientation of the roofs of HfH which spares the backyard from additional rainfall has been used as a model when planning the area.

Finally, just like HfH, we have come up with two different designs, *Villa Eva* and *Villa Maria,* to satisfy the different needs of the people. They are both easy to construct and volunteer friendly to allow unskilled workers, but perhaps slightly more expensive.

10.1 Villa Eva

The floor size of *Villa Eva* has been extended to 25m^2. It is a row house where the individual house is shaped as a square. This shape was chosen to maximize the ratio between floor area and length of walls and also to make the construction stable against earthquakes. The room height is only 2200mm, as stated earlier, the room height only has a small impact on indoor temperature and this would reduce costs of material. Since it is obvious that these small lot sizes are not sufficient, the houses have a 5x3m loft, partly with full room height.

Fig 40. Front side of Villa Eva

Heat and ventilation were the other major issues. These have been solved with various improvements. We have kept the solution of Habitat for Humanity with louver windows on the top floor. Both HfHP and GK have windows on opposite walls to allow cross draft, although there was no plan on how to raise inner walls and also the backyard tended to be extended with the result that windows were barred. Also, the rows of houses were placed close to each other which reduce the wind even further. In our suggestion we still have windows on opposite walls and a suggestion on where to raise inner walls both on the ground floor and on the loft without blocking the airways. We also suggest increased distance to the next row of houses.

Inner walls should be constructed in light materials which allow a good airflow, like plaited bamboo, straw and other natural materials, which are both beautiful, environmental friendly and have a low emission of particles. Curtains and drapes can also be used to divide rooms and allows both good ventilation and flexibility.

Fig 41. Backyard of Villa Eva

The kitchen is placed on the outside in a secured space. To place the kitchen outside has the benefit that there is a natural ventilation and preventing the inside of the house from additional heat, steam and particles. The kitchen area is sheltered from the weather with the loft acting as a roof. The opening towards the backside can be barred with decorative bars to prevent intruders.

The bathroom is placed indoors close to the kitchen for plumbing reasons, but still separated with walls and with a ventilation window to the backside. Even if the most important aspect for climatization in a tropical country is ventilation, some measures can be taken to prevent further heat generation indoors. Our main concern here is the roof. We believe that HfHP has a clear advantage with the use of aluminium sheets instead of steel. Besides from being more durable, the heat emission is lower. Still, we suggest instructions on how to add a ceiling. We also want the roof to be painted white or in a similar light colour to reflect sun radiation.

The design of the roof has some other advantages. To maximize the room height on the loft the ridge is placed over the centre of the loft, making it something between an ordinary gable roof and a monopitched roof. The HfHP monopitched roof had the disadvantage of not protecting the windows on the loft from rain, but with our solution you get a protecting roof overhang. We have used the maximum roof overhang of 800mm to protect the walls both from rain and to shade the façade.

Just like Gawad Kalingas houses, we want our houses to be complete when they are awarded. The windows, doors and loft should be on place. The bright and cheerful colours of Gawad Kalinga and focus on flower beds and trees should also be encouraged.

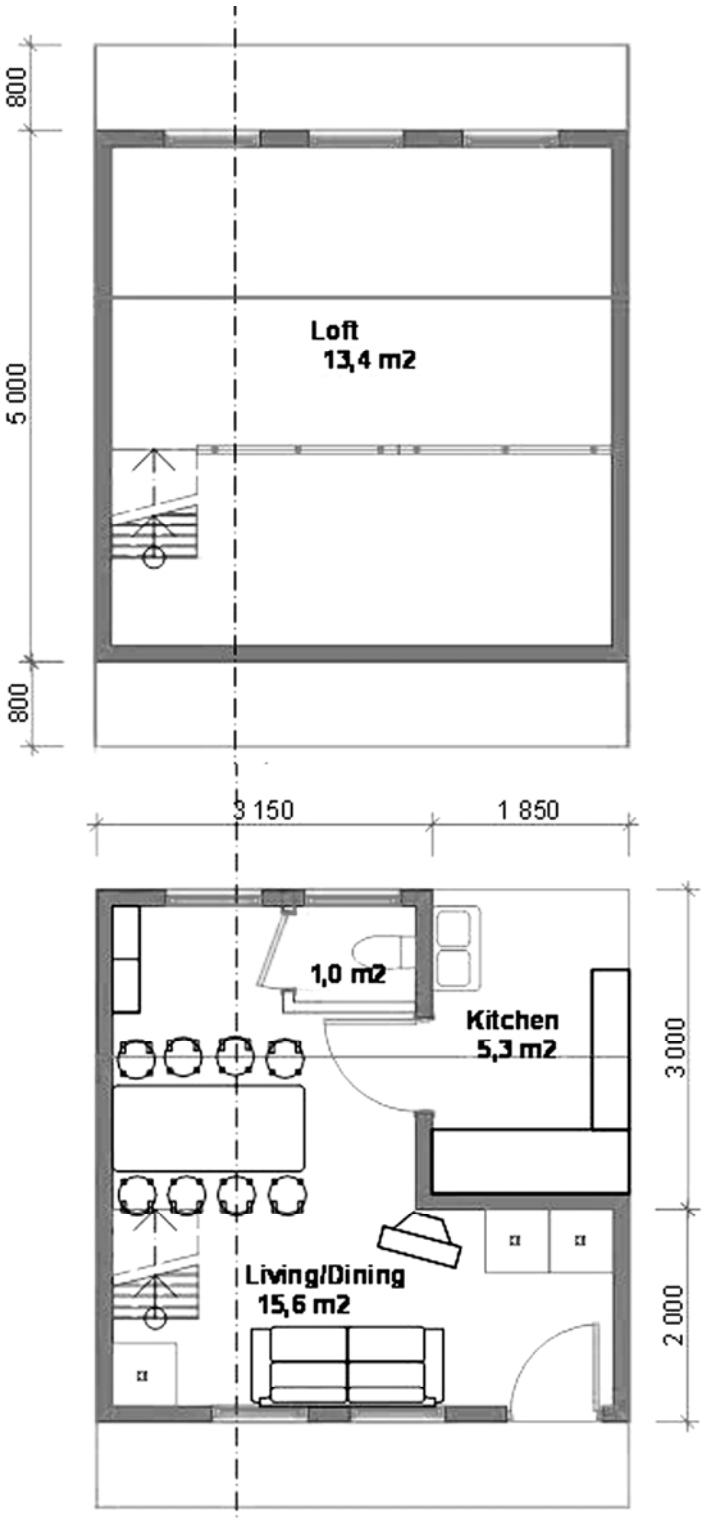


Fig 42. Above: First floor of Villa Eva. Below: Ground floor of Villa Eva

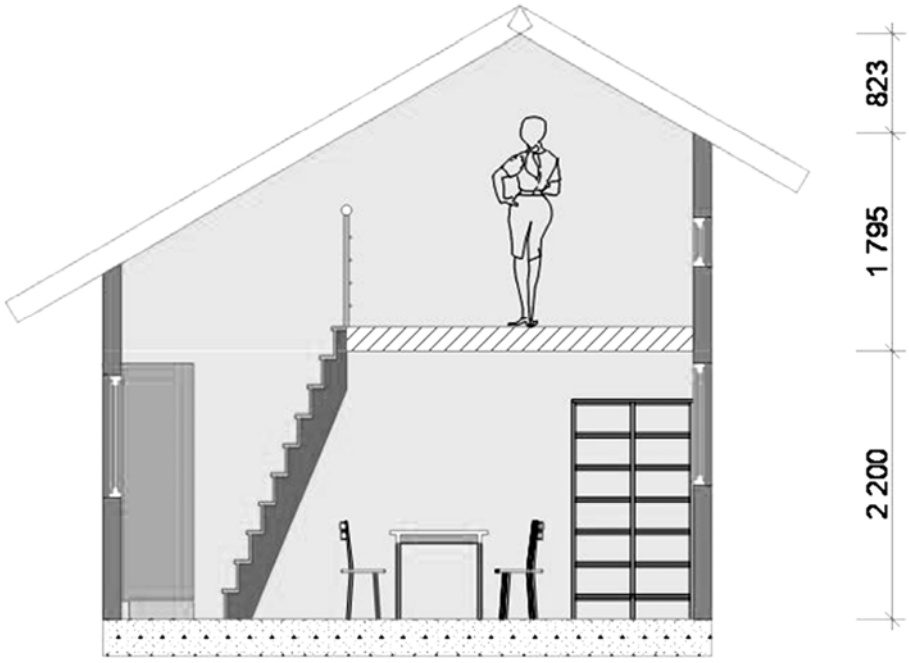


Fig 43. Section of Villa Eva

10.2 Villa Maria

Villa Maria is a duplex house with 2 full storeys. It is in total 49 m², which is slightly larger than Villa Eva and more than the double size of the existing houses in Baseco. The starting point with Villa Maria is the same as with Villa Eva: We want to eliminate as many problems as possible, without exceeding the budget – which is very low. However, we decided to construct a house which might cost a

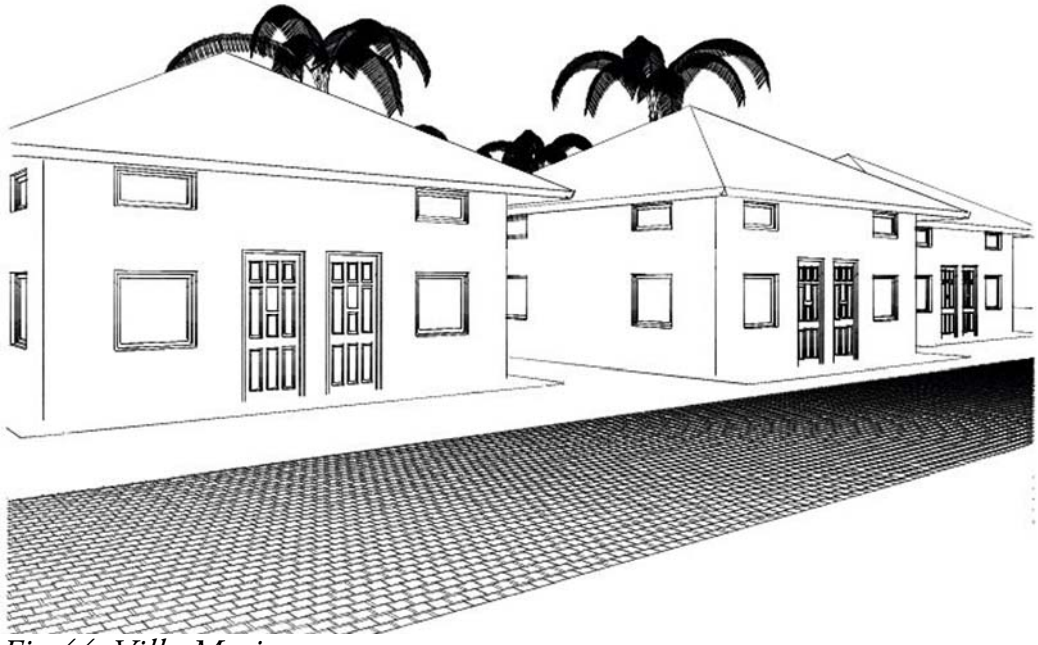


Fig 44. Villa Maria.

little more and therefore will not be categorized as a socialized housing, but instead low-cost housing. The advantages with this, apart from the fact that the area will be less monotone, is that the area will attract families who are a little less poor. This will give the area a face lift and a different reputation.

As the plans show, the shape of the whole duplex building is a square. This is to make them safer when an earthquake occurs. The shape of the individual house is oblong and the lower floor is naturally divided into two parts due to the placement of the toilet, kitchen and the stairs in the middle. The kitchen is – of course – preferably used as a kitchen and a dining area. The other part of the lower floor can be used according to the owners need. We got inspired of the houses made by HfHP, which had a commercial alternative to improve the livelihood in the area. Villa Maria is a variation of this. The owners have the possibility to use this space for commercial activity. If the family is large, it can be used as living area or as an additional bedroom. The kitchen and the toilet are placed close to each other for plumbing reasons.

Just as Villa Eva, the roof material should be of aluminium to prevent heat generation and make it more durable. The shape is a hipped roof to make it stand the typhoons better. It also has the advantage to protect all four walls from rain and sun. The room height on the first floor is the same as Villa Eva, which is 2200 mm. The room height on the second floor varies from 1100 mm to 3000 mm depending on how close to the centre of the building you are. The closer to the centre – the higher is the room height.

It seems to be very popular to put up inner walls and split the small house in to tiny rooms. Therefore, we designed this house that allows inner walls without stopping the airflow. The right part of *figure 45* shows an example of how to split the second floor in two rooms.

Again, the houses should be complete to avoid bad solutions and the colours bright and cheerful to lighten up the atmosphere.

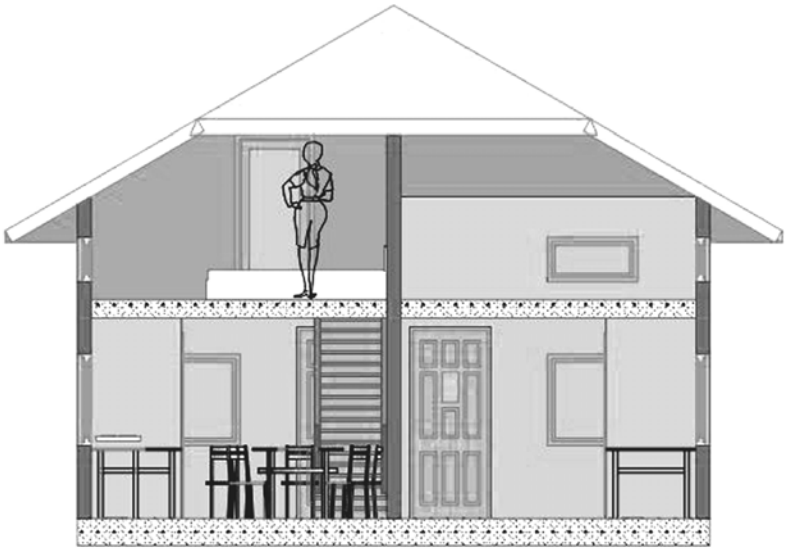


Fig 45. Section of Villa Maria, showing the two separate homes.

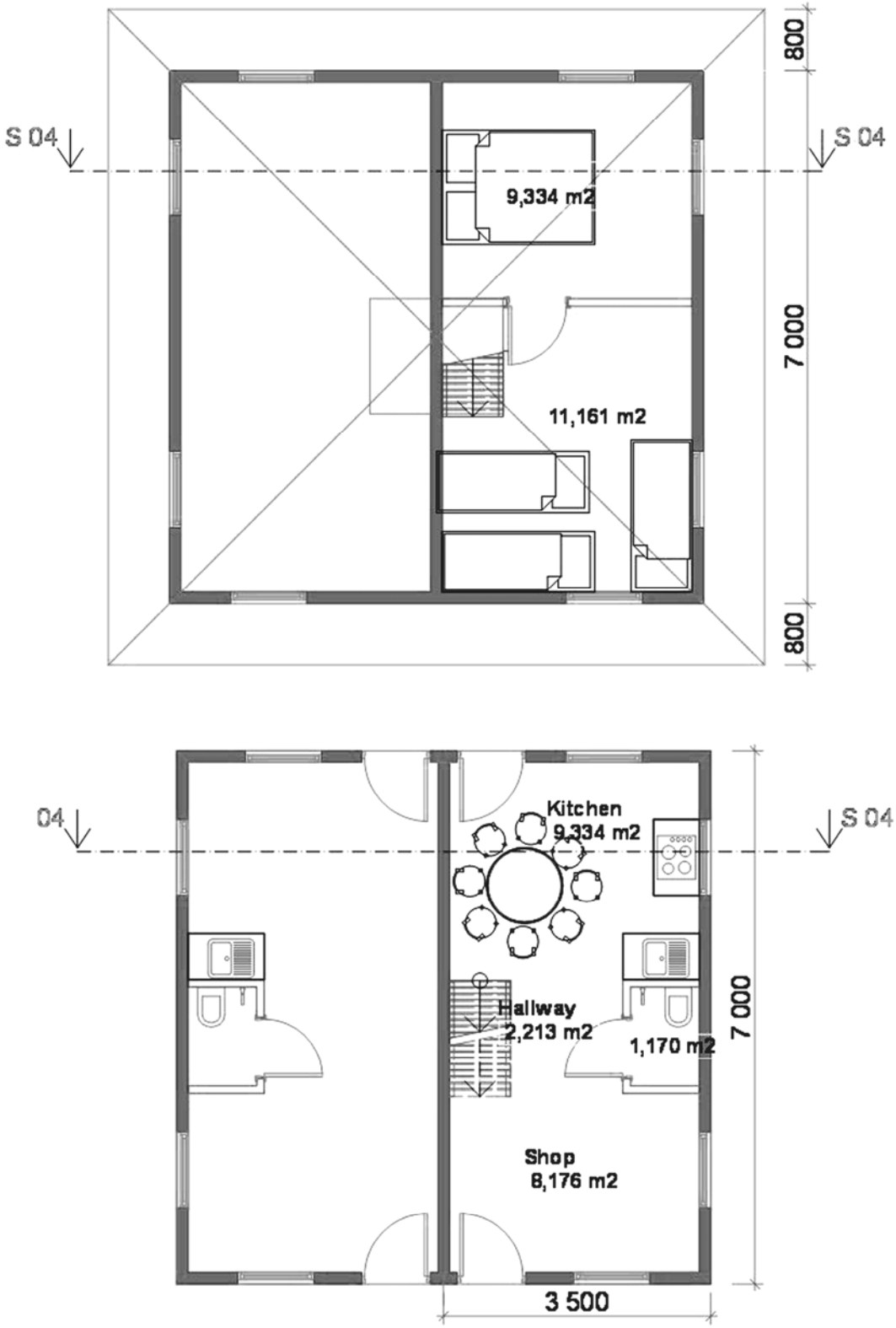


Fig 46. Above: Second floor of Villa Maria. Below: First floor of villa Maria

10.3 The area

The area we have planned has the same structure as the already developed part of Baseco. The houses are grouped into rows of six houses (30 meters) in straight lines. To make the area less monotonous we mixed the two house types in the same area.

To facilitate the air flow and improve the climate we have left more space between the houses. Other aspect that affects the climate is the verdure. Baseco is now a fairly green area, but the greenery consists of flowers and low bushes. This creates fresh air but no shading from the sun. The temperature gets extremely high and there are no places where to catch some shadow – excepted inside the houses which are even warmer. Therefore, we want to place high trees, preferably palm trees with long tree trunk and wide treetop. This does not hinder the wind, but gives shadow. People will be able to be outside and avoid the sun.

The backyards are, as mentioned before, very crammed, not only due to lack of space, but also because too many activities are carried out here: Cooking, laundry and showers. Therefore, our suggestion contains two common areas, one for shower and one for laundry. Those buildings are placed in the centre of a group of 132 homes. Between those buildings there is an open space of 20 · 13 meters. This is thought to be a playground and a park. This facilitate for the mothers to look after their children when they are doing their housework.

Trees and flowerbeds are of course planned for the area, but to make the plan easy to read, we deleted everything but the buildings.

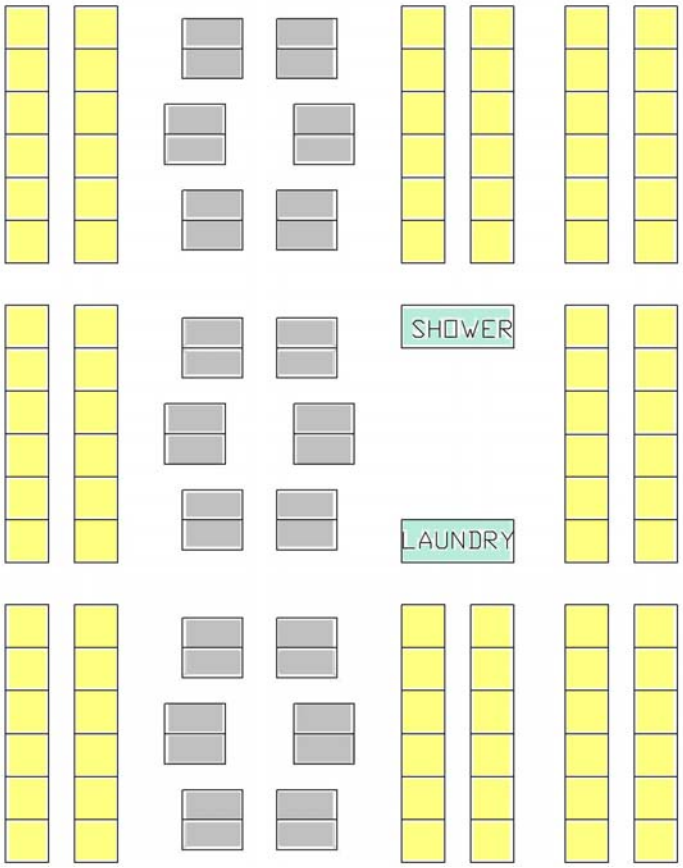


Fig 47. Suggestion on how to place the buildings. Grey units are Villa Maria and yellow ones are Villa Eva.

11 Conclusions

With the aid of the two Non-Governmental Organizations Gawad Kalinga and Habitat for Humanity thousands of families have found a way out of living in the slum, with new and improved houses. We asked ourselves in the beginning if the houses provided adequate shelter and satisfied their basic needs. They do so, but the question we should have asked is: Is it really enough?

It is affordable to live there, even for families with minimal resources. There is access to water, sanitation and electricity –at least if you can pay for it, it looks beautiful enough and with some of our suggestions the indoor climate could be improved. But the main problem is still space, and this problem is only solved with increased floor area.

HfH provided the opportunity to expand, and those families who had the economical resources extended their house on the backyard. This could have given the area some characteristic, but in most cases it only showed poor design. Since everyone wanted to expand, we decided to do the houses larger from the start to guarantee that no bad solutions are done. We also have two different houses with various square meters which gives the resident the possibility to chose a larger house if that is what they need (and if their budget allows it).

With an annual population growth rate of 2-3% the 47 000 inhabitants in Baseco of 2002 would be 56 000 in 2010 and 89 000 in 2030 (calculated on 2.3%). If the land was divided equally between all the residents of Baseco today, they would only have approximately ten square meters per person. That means that Baseco is already overcrowded and the population is not likely to decrease. If no measures are taken, Baseco will probably revert into slum again due to the overpopulation.

This conclusion made us certain that larger plot sizes was in fact the only alternative, because it is pointless to pack people close together if it is still not enough. It is better then to give some people enough space, so that they at least can be guaranteed a long-term sustainability. For the others, alternative solutions should be considered. Perhaps relocation is necessary for some, but we also believe that medium-rise buildings are the most important solution, even though it might be both expensive and difficult in Baseco.

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12.3 Other References

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12.4 Images Not By Authors

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For more information, these are the webpages of some of the organizations and agencies involved in urban poverty and housing in the Philippines.

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