

# GOOD BUILDING DESIGN AND CONSTRUCTION PRACTICES IN BARANGAY BAYBAY, CATARMAN, NORTERN SAMAR

## ABSTRACT

The Extension program conducted entitled “Good Building Design and Construction Practices” an adopt a Barangay program was undertaken in Barangay Baybay, Catarman, Northern Samar. It aimed to provide a series of training to the skilled workers and administered consultancy services on civil engineering practices. It undertakes a campaign information drive for safe building construction practices. There were 40 participants in attendance mostly composed of skilled workers. The module presented focuses on design construction, materials principles, and safety construction principles. Pre-tests and post-tests were given before and after the training program. From the administered pre-test, the lowest score was 7 and the highest score was 14 out of 15 items conducted, while from the post-test examination they got a perfect score and obtained a lowest 10 points score. The result on the House Building Checklist as to the type of house building structures was derived; there was 3.66 percent on concrete houses, 43.09 percent on mixed concrete and timber house, 46.74 percent were made of steel, concrete, and timber houses, and 6.51 percent are constructed with the indigenous house. The results on indicators of house building checklist obtained a; 95 percent of the structures do not have occupancy building certificates. The foundation was mostly built on sand because of its location facing the shoreline. The materials used were rivers stone and round. Most walls were covered with either concrete or hollow blocks and were tied to the column at 40 cm intervals. The roofing systems were made of more than 50 percent triangular trusses. For site drainage plan, almost 50 percent observed proper drainage plan and 65 percent of their walls are located nearer to their septic tank and 55 percent are located to floodable waterways and swampy areas. The structures are non-compliant with the building permit issuance. There were 200 structures were built within a radius of 15 meters from the seashore. The structures need to undergo repair because of the appearance of deteriorating construction materials. The results of the interview revealed that they have malpractice in the handling of construction materials and proper observation of the construction method.

**Keywords:** *construction practices, building design, construction safety*

## I. INTRODUCTION

The University of Eastern Philippines is programmed to develop and improve the quality and way of life among its students and stakeholders. The Civil Engineering Department one of its wings involved different extension activities to its different clientele in the Province of Northern Samar focusing on water resource management and some issues on structural design improvement. One of its central focuses today is the recent technology of Building Information Modelling (BIM) because of its holistic approach to designing building structures.

Building Design Construction is one of the top priorities of President Duterte's “build build build” government programmed projects. This government program alleviates the development of our countryside infrastructures project. Strong and coherent structures must be

emphasized in building structures. A safe house must be based on a strong foundation and therefore this must be given primary attention, Problems with foundations not properly designed lead to unequal settlement, cracking of walls and floors, and structural weakness. To resist outside forces, one must understand the use of the standards of materials, strict implementation of building specifications and follow the design strength of structures.

The Philippines is regularly exposed to climate-related hazards such as intensifying typhoons and floods, as well as seismic and volcanic events that have affected whole regions of the country. According to PHILVOCS Philippines is in the Pacific “Ring of Fire” and a major recipient of tropical storms hitting the country from the Pacific Ocean. The vulnerability of the country was demonstrated repeatedly through a volcanic eruption of Mayon-2019, the recent flash flood in Cabanatuan City in November 2019, and the earthquake in Tulan, Cotabato (magnitude 6.5) on October 31, 2019. They have caused several dead or were injured due, in part, to limited understanding of prevention, mitigation, and preparedness for disasters.

It is for this purpose that the university will provide extension activities beneficial to the adopted barangay, the Barangay Baybay of Catarman, Northern Samar, through the UEP College of Engineering. Generally, this extension program activity aims to disseminate campaign information for safe building design and construction practices within Barangay Baybay that will provide the services that will benefit its residents in their entire community. Specifically, this extensions activity aims to provide a series of training on Good Building Design and Construction Practices to the skilled workers, barangay officials, and its community; provide consultancy services in terms of civil engineering practices to the inhabitants of Barangay Baybay, Catarman, Northern Samar; and undertake campaign information drive for safe building design, construction practices, and construction occupational safety and health program.

## **II. METHODOLOGY**

Lecture, PowerPoint presentation, focal group discussion, field demonstration, hands-on practical works, and assessment of building checklist referring to house condition.

Design to minimize vulnerability to natural disasters like typhoons, earthquakes, and tsunamis such that it will safeguard their houses together with the occupants and their assets. It will guide them on how to tackle structural defects in construction that will lead to serious injury and death and loss of property when forces in nature strike. It will teach them how to use standards specifications set forth by the National Building Code of the Philippines and Provision of Structural Code of the Philippines. A dissemination campaign of information about construction occupational safety and health hazard.

## **III. RESULTS AND DISCUSSIONS**

The training conducted is to provide house owners in dealing with the principle and teaching of good building design and good construction practices in natural hazard-prone areas. It will guide them on whether to repair or rebuild their damaged houses according to the National Building Code of the Philippines. Barangay Baybay is one of the urban barangay of Catarman, Northern Samar located in the northeast portion of Catarman and facing the Pacific Ocean. It is a

beneficiary of the College of Engineering, University of Eastern Philippines “adopt a barangay” extension program activity.

The concept beyond this training workshop is designed to minimize vulnerability to natural disasters like typhoons, earthquakes, and tsunamis such that it will safeguard their houses together with the occupants and their assets. It will guide them on how to tackle structural defects in construction that will lead to serious injury and death and loss of property when the forces of nature strike. The training workshop was conducted on November 21-22, 2019, on the 2nd floor of Barangay Baybay Multi-Purpose Building situated at Catarman, Northern Samar. There were 40 trainees in attendance and the participants are composed of skilled workers, barangay staff and officials, graduating civil engineering students, and some residents of Barangay Baybay. The two-day training workshop was divided into four modules and after the training proper a workshop was conducted on the house building checklist to find out indicators like foundation, roofing, building materials, doors and windows, walls, building plan requirements, and other aspects. The four modules are distributed to the resource speakers from members of the Civil Engineering faculty department. The first module was delivered by Engr. Felix S. Licas their training program coordinator the topic is about design principles. The discussion focused on foundation, joining walls to roof trusses, tying walls to building structures, roof truss ties, drainage principles, and house elevation and location. Engr. Licas gives tips and advice on the safety of good building and construction practices. The second module was presented by Engr. Celeste A. De Asis, OIC chairman of the UEP Civil Engineering department. She discussed the construction and materials principles on the uses and functions of different materials from foundation to roofing systems like aggregates sand and gravel, cement, steel bars, lumber, and plumbing. She informed the participants of the correct mixing design of concrete and provide some provisions in the National Building Code of the Philippines. The third module was discussed by Engr. Kissa P. Banawis a faculty of the Civil Engineering department. Her presentation of the discussion focused on safety construction principles regarding planning, design, construction, and post-construction. She teaches how to deal with the construction occupational safety, and health hazard (COSH) program in building design construction processes. She emphasized that when designing a structure, it will start from the top of the structure down to the bottom while in constructing the structure it will start from the foundation up to the roof trusses. The fourth module was delivered by Engr. Ric C. Gonzaga is also a faculty from the same department. He presented the discussion on building construction methods on excavation works, concrete works, and architectural works. He guided the participants on the proper installation of the different works methods in building construction according to the Structural Code of the Philippines and in consonance with the National Building Code of the Philippines. He is responsible for the distribution of survey questionnaires on the House Building Checklist to seven (7) puroks of Barangay Baybay.

Pre-tests and post-tests were given before and after the training program was conducted. The results were very impressive. From the administered pre-test the lowest score is seven (7) and the highest score was fourteen (14) out of fifteen (15) items conducted, while from the post-test examination they got a perfect score and obtained a lowest 10 point score out of fifteen (15) items conducted.

The training of client satisfaction feedback both from the participants and their respective resource speakers from the four-module undertaken the results is very satisfactory. From the

client satisfaction feedback on quantity, quality, and timeliness their score ranging from 5.0 to 4.0 averages, and while their training evaluation feedback on training topics, training speakers, training sessions, food, and degree of satisfaction they got an average score of 4.3 from their respective participants. After the presentation of the four modules, a training program workshop was conducted on the house building checklist with the help of graduating civil engineering students as their facilitators with the supervision of Engr. Ric C. Gonzaga their training leader facilitator. The workshop conducted are divided into seven (7) puroks of Barangay Baybay and was clustered into 100 houses for every puroks in that Barangay. The results of the indicators presented in the House Building Checklist were very impressive as to the type of house building structures (please refer to the references). On the type of house classification, the following was derived; there were three-point sixty-six (3.66) percent on the concrete house, forty-three point zero nine (43.09) percent on mixed concrete and timber house, forty-six-point seventy-four (46.74) percent were made of steel, concrete, and timber houses, and six-point fifty-one (6.51) percent are constructed with the indigenous house. It was found out from a survey data gathered that only five (5) percent have a building permit and mostly don't have a certificate of occupancy as compliance for all structures built prescribed and mandated by the National Building Code of the Philippines.

An assessment of the house building checklist was undertaken after the training workshop was completed. On December 11, 2019, after the typhoon Tisoy strikes the Province of Northern Samar, Catarman its capital town was severely damaged and one of the affected barangay is Barangay Baybay because it is located facing the Pacific Ocean. There were 100 houses (results from a survey conducted by MDDRMO of Catarman) that were completely taken away from the wind and flood during the onslaught of typhoon Tisoy. Of the 100 houses, all of them were made of light materials meaning indigenous materials like nipa huts, bamboo poles, and coco lumber. Their location also is within the No Build Zone Area which was marked and imposed by the Municipal Engineering Office of Catarman.

During the conduct of the training workshop proper it was emphasized by the resource speakers that there must be a strict implementation of the No Build Zone Area Policy and that using indigenous materials is of no good because all the materials used in building construction must adhere to the specifications stated in the National Building Code of the Philippines and consonance with the provision of the Structural Code of the Philippines.

**Table 1.** Summary on House Classification

HOUSE CLASIFFICATION	Purok 1	Purok 2	Purok 3	Purok 4	Purok 5	Purok 6	Purok 7	Total	Percentage
CONCRETE HOUSE	0	0	5	5	0	30	5	45	3.66
CONCRETE & TIMBER	100	70	65	85	60	55	95	530	43.09
STEEL, CONCRETE & LUMBER	0	15	15	5	10	0	0	575	46.74
INDIGENOUS HOUSE	0	15	15	5	30	15	0	80	6.51
<b>Total</b>	100	100	100	100	100	100	100	1230	100

**Table 2.** Summary of House Building Checklist

Indicator	Remarks
<b>Foundation</b>	The foundation of houses in barangay Baybay are mostly built on sand because of their location facing the Pacific Ocean.
	Most of the houses in barangay Baybay have sufficient depth in their foundation
	The Materials used are taken from rivers stone and round.
<b>Walls</b>	In Barangay Baybay, the walls of the house are made after the erection of columns and column steel is covered with a minimum of 2 cm.
	Most walls of houses are covered with concrete or hollow blocks and tied to a column of 40cm intervals.
	The minimum size of column steel is 12mm and the stirrups used are 8mm and lateral ties of 10mm in diameter.
	More than 50 percent of the houses are using CHB and are layered neatly, mortar thickness is 1 cm., and window frames are on top of the beam.
	The minimum size of beam reinforcement is mostly using 12mm steel diameter and used minimum size of ring hoops is 8mm diameter
<b>Roofing</b>	The Roofing systems of houses in Barangay Baybay are made of more than fifty (50) percent triangular trusses.
	Most of the houses' trusses are tied and placed to columns and woodblocks are used for fixing purlins to the truss.
	More than fifty (50) percent of the houses are using cross bracing in between trusses and roof frames and are mostly covered with GI roofing.
<b>Doors &amp; Window Frame</b>	Most houses in barangay Baybay their Window frames are off-dry condition and their frames are tied to the walls and columns
<b>Building Materials</b>	Almost building materials in barangay baybay are made of sand, cement, sand, and gravel. The minimum size of gravel is 2cm.
	During construction, they are using dirty and salty water quality.
<b>Other</b>	For the site drainage plan, almost fifty percent of the houses erected in barangay

<b>Aspect</b>	Baybay observed proper drainage plan
	Fifty-five (55) percent of the houses are located in floodable waterways, swampy or in a tsunami, or prone to the sea.
	Sixty-five (65) percent of the houses their walls are located nearer to their septic tank
<b>Building Plan Requirements</b>	Ninety-five (95) percent of the houses in Barangay Baybay do not have building plans and building permits.

Based on the results of the house building checklist, ninety-five (95) percent of the structures in Barangay Baybay do not have a building permit. Most of the indigenous houses are located within Purok 4 and Purok 5. They are facing the Pacific Ocean and are built on No Build Zone Areas. The foundation of houses in barangay Baybay are mostly built on sand because of their location facing the shoreline of Barangay Baybay. The Materials used are taken from rivers stone and round. Most walls of houses are covered with either concrete or hollow blocks and were tied to the column of 40cm interval. The Roofing systems of houses in Barangay Baybay are made of more than fifty (50) percent triangular trusses. For the house drainage plan, almost fifty percent of the houses erected in barangay baybay observed proper drainage plan. Sixty-five percent (65) of the houses walls are located nearer to their septic tank.



1. Indigenous House



2. Mixed Concrete & Lumber



3. Concrete, Steel & Lumber

## CONSTRUCTION PRACTICES



Unfinished construction



House built on mixed concrete



Poor building design

## A GOOD BUILDING DESIGN STRUCTURES IN BARANGAY BAYBAY



## Assessment and Monitoring Period



**Figure 1.** Before the onslaught of Typhoon Tisoy photo taken on November 22, 2019



**Figure 2.** After the Typhoon Tisoy photo taken on December 11, 2019

The onslaught of typhoon Tisoy brought about 100 houses that were washed out to the shores of Barangay Baybay this is according to the interview of one of the members of the Catarman Municipal Disaster Risk Management Office. The structures are made of nipa hut, coco lumber, and bamboo pole materials.

## IV. CONCLUSION

Based on the workshop conducted most of the structures built in Barangay Baybay are non-compliant with the National Building Code of the Philippines on building permit issuance. From the result of survey questionnaires conducted, there were 200 structures were built within a radius of 15 meters from the seashore of Barangay Baybay. Most structures of Barangay Baybay need to undergo repair because of the appearance of deteriorating construction materials. It was revealed in the interview of some participants that they have malpractice in the handling of construction materials and proper observation of construction methods.

## V. RECOMMENDATIONS

The following are the recommendations postulated. Strict Implementation of building permit issuance before the conduct of house or building construction. The LGU of Catarman must emphasize the strict implementation of the No Build Zone Policy. There must be a building maintenance policy check-up to all building/house structures within the barangay Baybay premises. Follow up training on Good Building Design and Construction methods and other allied engineering services.

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