

**EFFECTS OF SUGARCANE FIBER IN THE NON-LOAD  
BEARING CAPACITY OF CONCRETE  
HOLLOW BLOCKS**

**Design Project**

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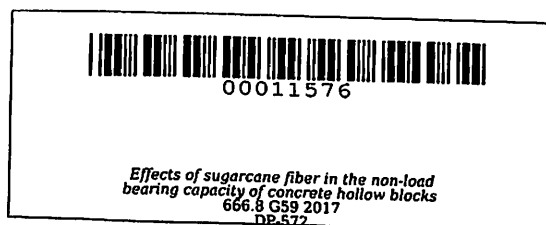
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# **EFFECTS OF SUGARCANE FIBER IN THE NON-LOAD BEARING CAPACITY OF CONCRETE HOLLOW BLOCKS**

**Undergraduate Design Project  
Submitted to the Faculty of the  
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## ABSTRACT

**GONZALES, ZAIDE A. Effects of Sugarcane Fiber in the Non-Load Bearing Capacity of Concrete Hollow Blocks.** Undergraduate Thesis. Bachelor of Science in Civil Engineering. Cavite State University, Indang, Cavite. May 2017. Adviser: Engr. Renato B. Cubilla.

The new generation continually demands for the development of the industry. Thus, building new infrastructures increases. With this development, the need of construction materials grows. The concept of construction advancement is beneficial to many, but with significant effects to the environment where the material came from. Sand is one of the raw materials in many construction projects. The demand for sand gradually increases. Sand mining, one of the way to generate sand, can cause deterioration to the river banks or any nearby structures. One of the development in the industry is the use of different substances in replacement for the common used materials. Agricultural waste such as bagasse is being disposed in the environment. This study focused on the use of sugarcane fiber as a partial replacement for the sand in the concrete hollow blocks. Concrete hollow block (CHB) is one of the most widely used construction material. The research aimed to determine the different properties of the fiber used in the study, as well as to evaluate its effects in the compressive strength and mass density of the CHBs. Fine aggregate has a fineness modulus of 3.00-4.00. The obtained fineness modulus for the sugarcane fiber is 3.99, thus it can be considered as fine aggregate. It has a compact mass density of 99.98 kg/m<sup>3</sup> and a loose mass density of 51.98 kg/m<sup>3</sup>. It has a water absorption of 1.30. Four treatments were prepared for the study, with nine specimens each. The prepared percentage replacements were 0%, 20%, 30%, and 40% by cement volume. The proportion used for cement to sand is 1:7 with the Philippine standard size of 40cm:

20cm: 10cm. Three samples from each treatment were prepared to subject to the 7<sup>th</sup>, 14<sup>th</sup>, and 28<sup>th</sup> day compression test. The average compressive strength of the control passed the Philippine National Standard (PNS) of 2.41 Mpa (350psi) for an average of three CHBs. The results showed that the optimum compressive strength of CHB with sugarcane fiber when with 20% mixture (0.94Mpa on the 28<sup>th</sup> day). However, this treatment did not pass the PNS. It was concluded that as the amount of bagasse increases, the compressive strength of the CHB decreases. The average mass of the concrete hollow blocks showed that as the amount of the bagasse increases and as the curing day takes longer, the mass of the CHB decreases. The least mass of the CHB can be obtained when its aggregate is replaced by 40% (951.80kg/m<sup>3</sup> on the 28<sup>th</sup> day). The results of the research showed that only the control passed the PNS, thus CHBs without sugarcane fiber can be used as non-load bearing concrete hollow blocks for structures. As for those CHBs that did not pass the PNS, it is not advisable to be used as a walling material or on any structure requiring the minimum 2.41Mpa of the PNS.

## TABLE OF CONTENTS

	Page
APPROVAL SHEET .....	ii
BIOGRAPHICAL DATA .....	iii
ACKNOWLEDGEMENT .....	iv
ABSTRACT .....	vi
LIST OF TABLES .....	xi
LIST OF FIGURES .....	xiii
LIST OF APPENDIX TABLES .....	xiv
LIST OF APPENDIX FIGURES .....	xvi
LIST OF APPENDICES .....	xvii
INTRODUCTION .....	1
Statement of the Problem .....	3
Objectives of the Study .....	3
Significance of the Study .....	4
Scope and Limitation of the Study .....	4
Time and Place of the Study .....	5
Definition of Terms .....	5

**REVIEW OF RELATED LITERATURE ..... 7**

**METHODOLOGY ..... 19**

    Materials and Apparatus ..... 19

    Methods ..... 20

    Data Gathering ..... 20

    Conceptual Framework ..... 21

    Collection and Preparation of Sugarcane Fiber ..... 22

    Determining the Fineness Modulus of Cement, Sand  
        and Sugarcane Fiber ..... 22

    Determining the Mass Density of Aggregates ..... 23

    Determining the Water Absorption of Sugarcane Fiber ..... 24

    Mixture Proportion of CHB ..... 25

    Proportioning and Mixing of Concrete ..... 25

    Preparation of Specimen ..... 26

    Compression Test ..... 27

    Statistical Design ..... 27

**RESULTS AND DISCUSSION ..... 28**

    Data Gathering ..... 28

    Fineness Modulus of Sugarcane Fiber, Sand and Cement ..... 28

Mass Density of Aggregates .....	29
Water Absorption of Sugarcane Fiber .....	30
Preparation of Sugarcane Fiber .....	30
Preparation of the Mixture .....	31
Production Cost .....	32
Mass Density of the CHBs .....	32
Compressive Strength of the CHBs .....	36
Seventh Day Compressive Strength .....	37
Fourteenth Day Compressive Strength .....	39
Twenty Eighth Day Compressive Strength .....	42
<b>SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>45</b>
Summary .....	45
Conclusions .....	47
Recommendations .....	48
<b>REFERENCES .....</b>	<b>50</b>
<b>APPENDICES .....</b>	<b>51</b>

## LIST OF TABLES

Table	Page
1    Chemical composition of Portland cement .....	9
2    Weight classification for CMU .....	11
3    Physical properties of bagasse fiber .....	15
4    Mechanical properties of bagasse .....	16
5    Minimum compressive strength of CHB (ASTM) .....	18
6    Compressive strength of non-load bearing CHB (Philippine National Standard) .....	18
7    Design mix of sand and sugarcane fiber .....	25
8    Percentage volume of bagasse per 1 CHB .....	26
9    Mass required per 1 piece CHB .....	26
10   Fineness modulus of aggregates .....	29
11   Mass density of aggregates .....	30
12   Water absorption of sugarcane fiber .....	30
13   Mass of the materials per 3CHB .....	31
14   Production cost per CHB .....	32
15   Mass of CHB on the 7 <sup>th</sup> , 14 <sup>th</sup> , and 28 <sup>th</sup> day .....	33

16    Strength of non-load bearing CHB after 7 days ..... 37

17    Strength of non-load bearing CHB after 14 days ..... 39

18    Strength of non-load bearing CHB after 28 days ..... 42

## LIST OF FIGURES

Figure		Page
1	Conceptual framework .....	21
2	Average mass of non-load bearing CHB after 7, 14, and 28 days .....	34
3	Average compressive strength of non-load bearing CHB after 7 days .....	38
4	Average compressive strength of non-load bearing CHB after 14 days .....	40
5	Average compressive strength of non-load bearing CHB after 28 days .....	43
6	Average compressive strength of non-load bearing CHB after 7, 14, and 28 days .....	44

## LIST OF APPENDIX TABLES

Appendix Table	Page
1    Fineness modulus of cement (trial 1) .....	53
2    Fineness modulus of cement (trial 2) .....	53
3    Fineness modulus of cement (trial 3) .....	54
4    Fineness modulus of sand (trial 1) .....	54
5    Fineness modulus of sand (trial 2).....	55
6    Fineness modulus of sand (trial 3).....	55
7    Fineness modulus of sugarcane fiber (trial 1) .....	56
8    Fineness modulus of sugarcane fiber (trial 2) .....	56
9    Fineness modulus of sugarcane fiber (trial 3) .....	57
10   Mass density of sand .....	57
11   Mass density of sugarcane fiber .....	58
12   Water absorption of sugarcane fiber .....	58
13   Average mass density of concrete hollow blocks on the 7 <sup>th</sup> day .....	59
14   Average mass density of concrete hollow blocks on the 14 <sup>th</sup> day .....	60
15   Average mass density of concrete hollow blocks on the 28 <sup>th</sup> day .....	61
16   Average compressive strength of CHB on the 7 <sup>th</sup> day .....	62
17   Average compressive strength of CHB on the 14 <sup>th</sup> day .....	63

18	Average compressive strength of CHB on the 28 <sup>th</sup> day .....	64
19	Analysis of variance of compressive strength after 7 days of curing .....	65
20	Comparison among means of compressive strength after 7 days of curing (DMRT) .....	65
21	Analysis of variance of compressive strength after 14 days of curing .....	66
22	Comparison among means of compressive strength after 14 days of curing (DMRT) .....	66
23	Analysis of variance of compressive strength after 28 days of curing .....	67
24	Comparison among means of compressive strength after 28 days of curing (DMRT) .....	67
25	Analysis of variance of mass density after 7 days of curing .....	68
26	Comparison among means of the mass density of CHB after 7 days of curing (DMRT) .....	68
27	Analysis of variance of mass density after 14 days of curing .....	69
28	Comparison among means of the mass density of CHB after 14 days of curing (DMRT) .....	69
29	Analysis of variance of mass density after 28 days of curing .....	70
30	Comparison among means of the mass density of CHB after 28 days of curing (DMRT) .....	70
31	Production cost analysis for treatment 1 .....	71
32	Production cost analysis for treatment 2 .....	71
33	Production cost analysis for treatment 3 .....	72
34	Production cost analysis for treatment 4 .....	72

## LIST OF APPENDIX FIGURES

<b>Appendix Figures</b>	<b>Page</b>
1 Sun drying of sugarcane fiber .....	74
2 Preparation of the sugarcane fiber proportion .....	74
3 Preparation of the mixture .....	75
4 Weighing of sugarcane fiber for the mass density .....	75
5 Set of sieves and sieve shaker .....	76
6 Pouring of the mixture in the concrete mixer .....	77
7 Mixture of the raw materials .....	78
8 Concrete hollow blocks mold .....	79
9 Molding of concrete hollow blocks .....	79
10 Drying of concrete hollow blocks .....	80
11 Curing of concrete hollow blocks .....	80
12 Testing of the concrete hollow blocks .....	81
13 Compressive strength result .....	82
14 Universal testing machine .....	83

**LIST OF APPENDICES**

<b>Appendix</b>		<b>Page</b>
1	Appendix Tables .....	52
2	Appendix Figures .....	73
3	Computations.....	84
4	Test Results .....	118

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## **INTRODUCTION**

Concrete hollow block (CHB) is made from a mixture of cement, aggregates and water. It is also referred to as concrete masonry unit (CMU).

Compared to other construction materials, CHBs are relatively low cost and easier to install by semi-skilled labourers. This is the reason why CHB is one of the general used walling materials in the Philippines. CHB walls are vulnerable against lateral loads (pushing or pulling forces from typhoon or earthquake). To increase their resistance against these lateral loads, steel reinforcing bars are added horizontally and vertically. Substandard bars immensely reproduce in construction stores and hardware due to high costs of steel bars. This leads to the rural and other suburban construction resulting to a low quality type of structure.

It is known that concrete hollow blocks are weak against lateral loads. But the materials that are usually used to overcome those deficiencies are more