

DEVELOPMENT OF VEGETATION PERVIOUS CONCRETE

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Master of Science in Materials Science

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Name of Supervisor: Prof. S.U. Adikary

Signature of the Supervisor:

Date:

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ABSTRACT

This study investigates the development of vegetation-supporting pervious concrete panels using recycled concrete aggregates (RCA) as a sustainable solution for slope protection and concrete waste management. This research explores the use of RCA and virgin aggregates to produce pervious concrete capable of managing surface water while supporting plant growth. Laboratory tests were conducted to assess the physical and mechanical properties of the materials, leading to a mix design developed using a non-compacted casting process. The resulting concrete demonstrated an average compressive strength of 3.25 MPa, flexural strength of 1.064 MPa, porosity of 40%, and a permeability coefficient of 68.599 mm/s after 28 days. Fly ash was incorporated to reduce the alkalinity of the cement paste, improving compatibility with plant life. Although the alkalinity initially decreased, pH levels remained was not favorable for plant growth and gradually increased over time due to cement hydration. A soil mix was integrated into the concrete to support vegetation further, and *cymbopogon citratus* and *cymbopogon confertiflorus* were identified as suitable plant species. The findings highlight that vegetation pervious concrete is an effective, eco-friendly solution that combines water management and ecological restoration, offering a value-added use for recycled concrete in sustainable construction.

Keywords: pervious concrete, alkalinity reduction, slope stabilization, water infiltration, permeability

TABLE OF CONTENTS

Declaration	i
Acknowledgement	ii
Abstract	iii
Table of Contents	iv
List of Figures	viii
List of Tables	x
List of Abbreviations	xi
Chapter 1	1
1. Introduction	1
1.1 Background	1
1.2 Objective	2
Chapter 2	3
2. Literature Review	3
2.1 Importance of Landslide Mitigation	3
2.2 Techniques for Landslide Mitigation	3
2.2.1 Grid Beam Structures	3
2.2.2 Soil Nailing With Protective Nets	4
2.2.3 Gabion Box	4
2.2.4 Shotcreting	5
2.3 Concrete Waste and Recycled Aggregates	5
2.4 Properties of Recycled Aggregates	6
2.5 Properties of Virgin Aggregates	7
2.6 Pervious Concrete	7
2.6.1 Pervious Concrete Types	7
2.6.2 Properties of Pervious Concrete	9

2.6.3	Application of Pervious Concrete	9
2.7	Integration of Vegetation into Pervious Concrete	10
2.8	Effect of Alkalinity on Vegetation.....	10
2.8.1	Reduction of Alkalinity in Concrete	11
2.9	Selection of Suitable Plants	12
2.10	Development of Plant Growth Media	12
Chapter 3		14
3.	Methodology	14
3.1	Recycled Aggregates.....	14
3.1.1	Mechanism of Extracting Recycled Aggregates.....	14
3.1.2	Testing of Recycled Concrete Aggregates.....	15
3.2	Virgin Aggregates	17
3.2.1	Selection Process of Virgin Aggregates.....	17
3.2.2	Testing of Virgin Aggregates.....	17
3.3	Pervious Concrete Mix Design with Recycled Aggregates	18
3.4	Mix Design of Pervious Concrete with Virgin Aggregates	20
3.4.1	Mix Design Formulation.....	20
3.4.2	Sample Preparation	20
3.5	Physical and Mechanical Properties of Formulated RCA Mix Design .	22
3.5.1	Compressive Strength	22
3.5.2	Flexural Strength.....	22
3.6	Physical and Mechanical Properties of Formulated VA Mix Design....	23
3.6.1	Compressive Strength	23
3.6.2	Porosity / Void Content	24
3.6.3	Permeability Coefficient	24
3.6.4	Flexural Strength.....	25

3.7	Alkalinity Reduction of Cement Paste.....	26
3.7.1	Adding a Weak Acid to Reduce The Alkalinity	26
3.7.2	Adding Fly Ash to Reduce the Alkalinity.....	27
3.8	Selection of Plants for Vegetation	29
3.9	Selection of the Most Suitable Soil Mix	30
3.10	Embedding the Soil Mix into the Pervious Concrete.....	31
3.11	Study the Plant Growth on the Pervious Concrete.....	32
Chapter 4.....		33
4.	Results	33
4.1	Recycled Aggregates.....	33
4.1.1	Density and Water Absorption Coefficient.....	33
4.1.2	Flakiness and Elongation Index	34
4.2	Virgin Aggregates	34
4.2.1	Density and Water Absorption Coefficient.....	34
4.2.2	Flakiness and Elongation Index	34
4.3	Properties of Pervious Concrete Mix	35
4.3.1	Pervious Concrete Mix Design Formulated Using RCA.....	35
4.3.2	Pervious Concrete Mix Design Formulated Using VA	35
4.4	Alkalinity Reduction	36
4.4.1	Adding a Weak Acid.....	36
4.4.2	Adding Fly-Ash	37
4.5	Plant Growth	42
Chapter 5.....		44
5.	Discussion	44
5.1	Raw Materials of Pervious Concrete	44
5.2	Alkalinity Reduction	46

5.3	Properties of Pervious Concrete Mix	47
5.4	Plant Growth on Pervious Concrete.....	49
6.	Conclusion.....	51
7.	Recommendation and Future Work	52
7.1	Recommendation	52
7.2	Future Work	52
References		53

LIST OF FIGURES

Figure	Description	Page
Figure 2.1	Grid beam structure	4
Figure 2.2	Shotcreting	5
Figure 2.3	Disposed concrete waste	6
Figure 2.5	Pervious concrete parking lots	9
Figure 2.4	Pervious concrete swimming pool deck	9
Figure 3.1	(a) Recycled aggregates before washing, (b) Recycled aggregates after washing	14
Figure 3.2	(a) Specific gravity testing, (b) SSD aggregate sample	15
Figure 3.3	(a) Testing aggregate crushing value, (b) Aggregate sample after doing testing	16
Figure 3.4	(a) Determination of flakiness index, (b) Determination of elongation index	17
Figure 3.5	(a) Determination of flakiness index, (b) Determination of elongation index	18
Figure 3.6	Relationship between paste volumes and void content (Report on Pervious Concrete, 2010)	19
Figure 3.7	Pervious concrete mixture	20
Figure 3.8	Casted test specimens RCA pervious concrete	21
Figure 3.9	Casted pervious concrete panels	21
Figure 3.10	Testing arrangement of compressive strength test ((a) Before & (b) After testing compressive strength)	22
Figure 3.11	Testing arrangement of flexural strength test ((a) Before & (b) After testing flexural strength)	23
Figure 3.12	Compressive strength testing of formulated mix design using VA	23
Figure 3.13	(a), (b) Testing porosity / void content of pervious concrete	24

Figure 3.14	Void content test apparatus	25
Figure 3.15	Test arrangement for flexural strength test	26
Figure 3.16	Ammonium Chloride & OPC	27
Figure 3.17	pH testing of cement paste at the initial stage	27
Figure 3.18	Hardened cement paste samples	28
Figure 3.19	Crushed cement paste & water before mixing	28
Figure 3.20	pH testing of hardened cement paste	28
Figure 3.21	pH testing of soil mix	29
Figure 3.22	(a) <i>Cymbopogon citratus</i> , (b) <i>Cymbopogon confertiflorus</i>	30
Figure 3.23	(a) Coco peat, HPMC & water mixture, (b) Coco peat, soil & water mixture, (c) Coco peat, soil, compost & water mixture	31
Figure 3.24	Plant growth in soil & coco peat mix vs HPMC & coco peat mix	31
Figure 3.25	(a) Pervious concrete panel, (b) Pour the soil mix onto the panel, (c) Panel after embedding the soil mix, (d) Add a compost layer onto the top surface of the panel	32
Figure 4.1	pH value variation with time for OPC and Fly Ash mix cement paste	38
Figure 4.2	pH value variation with time for BHC and Fly Ash mix cement paste	38
Figure 4.3	Growth of <i>Cymbopogon confertiflorus</i> after planting on pervious concrete. (a) 0th day (b) 3rd day	42
Figure 4.4	Growth of <i>Cymbopogon confertiflorus</i> after planting on pervious concrete. (a) 7th day and (b) 28th day	42
Figure 4.5	Growth of <i>Cymbopogon citratus</i> after planting on pervious concrete. (a) 0th day (b) 3rd day and (c) 7th day	43

LIST OF TABLES

Table	Description	Page
Table 4.1	Comparison of the water absorption coefficient of recycled aggregates with different content of cement paste	33
Table 4.2	Comparison of the density of recycled aggregates with different bases	33
Table 4.3	Flakiness & elongation indexes	34
Table 4.4	Density and water absorption coefficient of virgin aggregates	34
Table 4.5	Flakiness index and elongation index of virgin aggregates	34
Table 4.6	Physical and mechanical properties of pervious concrete mix design formulated using recycled aggregates	35
Table 4.7	Physical and mechanical properties of pervious concrete mix design formulated using virgin aggregates	36
Table 4.8	pH variation of different proportions of OPC and NH_4Cl mixes	36
Table 4.9	pH of cement pastes that have hardened with varying amounts of fly ash, BHC, and OPC after 3, 7, 14, 28, and 56 days	37
Table 4.10	pH variation of fresh OPC pastes with different proportions of fly ash during the first hour after mixing	39
Table 4.11	pH variation of fresh OPC pastes with different proportions of fly-ash during the 1 to 2 hour period after mixing	39
Table 4.12	pH variation of fresh OPC pastes with different proportions of fly ash during the 2 to 3-hour period after mixing	40
Table 4.13	pH variation of fresh BHC pastes with different proportions of fly ash during the first hour after mixing	40
Table 4.14	pH variation of fresh BHC pastes with different proportions of fly ash during the 1 to 2 hour period after mixing	41
Table 4.15	pH variation of fresh BHC pastes with different proportions of fly-ash during the 2 to 3 hour period after mixing	41

LIST OF ABBREVIATIONS

Abbreviation	Description
RCA	Recycled Concrete Aggregates
PC	Pervious Concrete
ACI	American Concrete Institute
OPC	Ordinary Portland Cement
BHC	Blended Hydraulic Cement
CAC	Calcium Aluminate Cement
ACV	Aggregate Crushing Value
BS	British Standard
BS EN	British Standard European Norm
VA	Virgin Aggregates
ASTM	American Society for Testing and Materials
PVC	Poly Vinyl Chloride
NBRO	National Building Research Organization
USGS	United States Geological Survey