DEVELOPMENT OF VEGETATION PERVIOUS CONCRETE

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Master of Science in Materials Science

Department of Materials Science and Engineering

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

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DECLARATION

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Name of Supervisor: Prof. S.U. Adikary

Signature of the Supervisor: Date:

ACKNOWLEDGEMENT

I wish to express my special thanks and sincere gratitude to my supervisor, Prof. S.U. Adikary, Professor at the Department of Materials Science and Engineering, Faculty of Engineering, University of Moratuwa, for his invaluable guidance, encouragement, patience, and the precious time he offered me.

I wish to extend my sincere gratitude to Emeritus Prof. S.M.A. Nanayakkara for his invaluable guidance and unwavering support throughout my research journey.

I would like to thank all the staff of the Department of Materials Science and Engineering, Faculty of Engineering, University of Moratuwa, for their valuable support and guidance.

I greatly appreciate and express my sincere gratitude to Eng. (Dr.) Asiri Karunawardena, Director General of the National Building Research Organization (NBRO) of Sri Lanka, and Eng. (Mrs). S.S.K. Muthurathne, Director, Building Material Research & Testing Division of NBRO, and the management of NBRO for their technical and financial support.

I would also like to extend my sincere gratitude and appreciation to the Building Materials Research and Testing Division, NBRO, Sri Lanka, for providing the facilities to carry out the testing.

Lastly, I would like to thank my family and loved ones for their unwavering support and encouragement throughout the entire journey.

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

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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