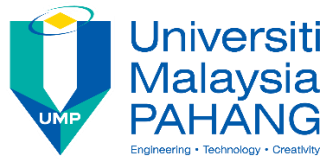


PERFORMANCE OF SOFT CLAY STABILIZED
WITH THE REPLACEMENT OF PALM OIL
FUEL ASH AND GYPSUM

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MASTER OF SCIENCE

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and, in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Science

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
Master of Science

Faculty of Civil Engineering
UNIVERSITI MALAYSIA PAHANG

APRIL 2022

ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude to Allah for His poured blessings and mercy to grant me success in all my endeavors. A Special appreciation and thanks to my research supervisor, Associate Prof. Ts. Dr Muzamir Bin Hasan for his support and guidance throughout my master's degree. His efforts in guiding me step by step and advice in solving all the problems encountered me which are invaluable to me. Without his encouragement, support, and motivation, it would be hard to end this journey.

I am also so grateful that our university, University Malaysia Pahang had provided me with a comfortable working environment and allowed me to use all the needed equipment. I would like to show my appreciation to the laboratory staff (Encik Ziu, Encik Azmi and Encik Haliman) for their guidance and instructions during the laboratory works of my research. Their instructions are clear and without fail. In addition.

Apart from that, I also would like to thank all my beloved family who was always the backbone for me during the research work and all the time. Especially My precious wife Nabiha Yahya Mohammed Al-raidi for her love, endless support, and accompany at all the time to the completion of my journey. I would like to send my deepest appreciation to my awesome father Ali Mohammed Nasser Alhokabi, my lovely Mother Khaizaran Hadi Saleh Algothaifi for all their incomparable support, prayers, and patience for being away from them. I appreciate the pieces of advice and encouragement from everyone that I met during the research and to all UMPian friends, who was always for me during the journey.

ABSTRAK

Pertumbuhan penduduk di seluruh dunia memerlukan lebih banyak cara hidup, penginapan dan makanan, yang membawa kepada pergerakan orang ke garis pantai atau kawasan tanah lemah yang tidak stabil. Malaysia sebagai salah satu pengeluar utama minyak sawit dikehendaki menghasilkan bekalan yang mencukupi untuk memenuhi permintaan global minyak sawit dan mengekalkan pendapatan negara kasarnya. Walau bagaimanapun, penjana kira-kira 5 juta tan sisa abu bahan api minyak sawit setiap tahun mempunyai kesan alam sekitar yang berbahaya. Untuk menangani kedua-dua isu, jurutera menyesuaikan kitar semula sisa POFA untuk menstabilkan dan mempertingkatkan pelbagai sifat geoteknik tanah lemah liat, kaolin sebagai contoh. Kajian ini memfokuskan kepada kesan campuran POFA dan gabungan POFA-gypsum terhadap prestasi kaolin di mana gypsum adalah pengaktif pozzolan. Menggunakan POFA sebagai agen penstabil mengurangkan isu alam sekitar dan kos tapak pelupusan sisa serta meningkatkan sifat tanah liat lembut. Mencapai matlamat teknologi hijau Malaysia memerlukan kaedah alternatif untuk mengimbangi pertumbuhan ekonomi dan keistimewaan alam sekitar. Penyelidikan ini bercadang untuk menyiasat peranan POFA dan gypsum dalam meningkatkan sifat tanah liat kaolin dari segi graviti tentu, keplastikan, parameter pemadatan, kebolehtelapan, mampatan, dan kekuatan ricih dengan tempoh pengawetan. Kaolin S300 digunakan sebagai sampel tanah liat kawalan, POFA dan gypsum sebagai agen penstabil. Nisbah gypsum optimum ialah (4% dan 6%) berdasarkan literatur sebelumnya, dicampur sebagai pengikat dengan pelbagai peratusan POFA (0,5,10, dan 15). Keputusan sampel yang dirawat menunjukkan penurunan jelas graviti tentu dengan penambahan POFA-Gypsum, pengurangan indeks keplastikan, perubahan parameter ciri pemadatan di mana kandungan air optimum meningkat dengan pengurangan ketumpatan kering maksimum, variasi kebolehtelapan dan peningkatan mampatan dan ricih. kekuatan dengan tempoh pengawetan dan jumlah aditif. Secara keseluruhannya, campuran POFA, gypsum dan POFA-gypsum meningkatkan sifat geoteknik tanah liat yang dirawat.

ABSTRACT

The worldwide population growth requires more means of life, accommodation, and food, which leads to people's motion to the coastline or unstable weak soil areas. Malaysia as one of the main producers of palm oil is required to produce enough supplies to meet the palm oil global demand and maintain its gross national income. However, the generation of about 5 million tons annually of palm oil fuel ash waste have a harmful environmental impact. To tackle both issues, engineers adapted POFA waste upcycling to stabilize and enhance various geotechnical properties of clayey weak soil, kaolin as an example. This study is focusing on the effect of POFA and combined POFA-gypsum mixture on the performance of kaolin where gypsum is a pozzolan activator. Utilizing POFA as a stabilizing agent reduces environmental issues and waste landfill costs and enhances soft clays properties. Achieving Malaysian green technology goals requires an alternative method to balance economic growth and environmental privilege. This research proposes to investigate POFA and gypsum's role in improving kaolin clay properties in terms of specific gravity, plasticity, compaction parameters, permeability, compressive, and shear strength with the curing period. Kaolin S300 is used as a control clay sample, POFA and gypsum as stabilizing agents. The optimum gypsum ratio is (4% and 6%) based on the previous literature, mixed as a binder with various POFA percentages (0,5,10, and 15). The results of treated samples show a clear drop of specific gravity with POFA-Gypsum addition, reduction of plasticity index, change of compaction characteristics parameters where optimum water content increased with a reduction in maximum dry density, variation in permeability and enhancement of compressive and shear strength with curing period and additives amount. Overall, POFA, gypsum and POFA-gypsum mixture enhanced the geotechnical properties of treated clay.

TABLE OF CONTENT

| | |
|--|--------------|
| DECLARATION | |
| TITLE PAGE | |
| ACKNOWLEDGEMENTS | ii |
| ABSTRAK | iii |
| ABSTRACT | iv |
| TABLE OF CONTENT | v |
| LIST OF TABLES | ix |
| LIST OF FIGURES | x |
| LIST OF SYMBOLS | xvi |
| LIST OF ABBREVIATIONS | xvii |
| LIST OF APPENDICES | xviii |
| | |
| CHAPTER 1 INTRODUCTION | 1 |
| 1.1 Background of the Study | 1 |
| 1.2 Problem Statement | 3 |
| 1.3 Objectives of the Study | 5 |
| 1.4 Scope of the Study | 5 |
| 1.5 Significance of the Study | 6 |
| 1.6 Outline of the Study | 6 |
| | |
| CHAPTER 2 LITERATURE REVIEW | 8 |
| 2.1 Introduction | 8 |
| 2.2 Soft clay | 8 |
| 2.2.1 Physical Properties of Soft Clay | 9 |
| 2.2.2 Mechanical Properties of Soft Clay | 10 |

| | | |
|------------------------------|---|-----------|
| 2.2.3 | Undrained Shear Strength of Soft Clay | 11 |
| 2.3 | Kaolin | 12 |
| 2.3.1 | Chemical Properties of Kaolin | 12 |
| 2.3.2 | Physical Properties of Kaolin | 14 |
| 2.3.3 | Mechanical properties of Kaolin | 17 |
| 2.4 | Palm Oil Fuel Ash (POFA) | 21 |
| 2.4.1 | Chemical Properties of POFA | 22 |
| 2.4.2 | Physical Properties of POFA | 23 |
| 2.4.3 | Mechanical Properties of POFA | 26 |
| 2.5 | Gypsum | 29 |
| 2.5.1 | Chemical Properties of Gypsum | 30 |
| 2.5.2 | Physical Properties of Gypsum | 32 |
| 2.5.3 | Mechanical Properties of Gypsum | 35 |
| 2.6 | Soil Properties Improvement Factors | 39 |
| 2.6.1 | Physicochemical Behavior of POFA-Gypsum Mixture | 39 |
| 2.6.2 | Pozzolanic Reaction Method | 41 |
| 2.7 | Conclusion | 42 |
| CHAPTER 3 METHODOLOGY | | 43 |
| 3.1 | Introduction | 43 |
| 3.2 | Laboratory Tests and Standards | 45 |
| 3.3 | Samples Preparation | 46 |
| 3.3.1 | Preparation of Kaolin-POFA-Gypsum Mixtures | 46 |
| 3.3.2 | Preparation of Samples for Physical and Mechanical Properties Tests | 48 |
| 3.3.3 | Preparation of Samples for the Unconfined Compression Tests | 48 |

| | | |
|---|--|-----------|
| 3.4 | Physical Properties of kaolin with POFA and Gypsum | 49 |
| 3.4.2 | Moisture Content | 50 |
| 3.4.3 | Specific Gravity Test | 50 |
| 3.4.4 | Particle Size Distribution | 51 |
| 3.4.5 | Consistency Limits and Linear Shrinkage | 53 |
| 3.4.6 | Falling Head Permeability Test | 56 |
| 3.4.7 | Standard Proctor Compaction Test | 57 |
| 3.5 | Unconfined Compression Test | 58 |
| 3.6 | Chemical and morphological properties of kaolin with POFA and Gypsum | 62 |
| 3.6.1 | Scanning Electron Microscope (SEM) | 62 |
| 3.6.2 | X-ray fluorescence | 63 |
| 3.7 | Summary | 63 |
| CHAPTER 4 RESULTS AND DISCUSSION | | 64 |
| 4.1 | Introduction | 64 |
| 4.2 | Chemical Compositions | 64 |
| 4.3 | Physical properties | 65 |
| 4.3.1 | Particle Size Distribution | 66 |
| 4.3.2 | Consistency Limit | 68 |
| 4.3.3 | Specific Gravity | 77 |
| 4.4 | Mechanical Properties | 79 |
| 4.4.1 | Standard Compaction | 79 |
| 4.4.2 | Falling Head Permeability | 85 |
| 4.5 | Compressive Strength Results | 87 |
| 4.5.1 | Stress-Strain Curve | 87 |
| 4.5.2 | Shear Strength | 97 |

| | | |
|--|--|------------|
| 4.5.3 | Improvement of Shear Strength with curing time | 105 |
| 4.6 | Correlation of Shear Strength with variables | 107 |
| 4.6.1 | Correlation of Shear Strength with curing period | 108 |
| 4.6.2 | Correlation of Shear Strength with stabilizing agents. | 110 |
| 4.6.3 | Correlation of Shear Strength by adding POFA. | 114 |
| 4.7 | Microstructure and Morphological Properties | 116 |
| 4.8 | Conclusion | 123 |
| CHAPTER 5 | | 124 |
| CONCLUSIONS AND FUTURE RECOMMENDATION | | 124 |
| 5.1 | INTRODUCTION | 124 |
| 5.2 | CONCLUSION | 124 |
| 5.3 | RECOMMENDATIONS FOR FUTURE WORK | 126 |
| REFERENCES | | 128 |
| APPENDICES | | 141 |

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