APPROVAL AND DECLARATION SHEET

This project report titled Study on Physical, Morphological and Strength Properties of Jana Manjung Ash Mixture was prepared and submitted by Asyraf Nasuha bt Mohd Yunus (091200118) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Building Engineering) in Universiti Malaysia Perlis (UniMAP).

Checked and Approved by

_____

(DR. AFIZAH BT AYOB)
Supervisor

School of Environmental Engineering
Universiti Malaysia Perlis

June 2013

ACKNOWLEDGEMENT

For the beginning, I am so grateful towards ALLAH S.W.T the Almighty that bestowed me and giving me the opportunity to finish my meaningful study.

To complete this Bachelor Degree Project report, I had received a lot of information and valuable guidance from my supervisor, Dr.Afizah bt Ayob. Her knowledge and research on related subjects are particularly helpful to provide me the insights and understanding needed to complete this report. Thus, I wish to express my deepest gratitude and appreciation to her for her generosity, critics, and intellectual support.

Sincere gratitude goes to all the technicians and research officers in the School of Environmental Engineering and School of Material Engineering for give me a chance to use the machines there.

I am very thankful for the prayer and everlasting love from the most important persons in my life, my family with their support and encouragements giving me the spirit to always think out of the box and be the best.

Last but not least, I would like to dedicate my warmth thanks to my friends especially my partner doing all the laboratory works, Muhd Al-Hafiz bin Muhammad Yusoff and all who has involved directly and indirectly during this study. I pray that ALLAH S.W.T would repay your kindness and assistance to me. Thank you so much.

KAJIAN TENTANG SIFAT-SIFAT FIZIKAL, MORFOLOGI DAN KEKUATAN CAMPURAN ABU TERBANG DAN ABU DASAR DARI JANA MANJUNG

ABSTRAK

Bahan mentah seperti arang batu telah digunakan di Malaysia untuk menjana atau menghasilkan elektrik sejak 1988..Pembakaran arang batu menghasilkan sisa yang berlebihan dan secara langsung menyebabkan masalah ekonomi dan alam sekitar yang ketara. Abu itu tidak diuruskan dengan baik dan dibuang di dalam kolam sisa. Seperti di Manjung, Perak, abu adalah pemindahan dari kilang ke tanah tidak produktif dan beban kewangan untuk masa jangka panjang. Kajian ini memberi tumpuan kepada beberapa sifat abu terbang, abu bawah dan campuran mereka dari loji kuasa Manjung. Ciri-ciri yang termasuk dalam ciri-ciri tingkah laku yang dikaji ialah pemadatan, sifat-sifat kekuatan dan sifat-sifat morfologi. Sifat-sifat kekuatan sampel boleh dilakukan melalui ujian mampatan tak terkurung (UCT). Ciri-ciri fizikal yang terlibat ujian pemadatan dan analisis ayak gandum. Morfologi dan mineralogi campuran abu arang batu dijalankan menggunakan pembelauan X-Ray (XRD) dan Mikroskop Imbasan Elektron (SEM). Sampel menjalani pemadatan, dimeterai dan sembuh untuk 0 dan 28 hari sebelum analisis lanjut. Sudut geseran bagi makmal XRD diperolehi daripada pelbagai 24 ° -36 °. Morfologi menunjukkan peningkatan jumlah zarah yang tidak teratur dan ikatan antara komponen yang kuat seperti umur peningkatan tempoh pengawetan. Terdapat beberapa sebatian kristal wujud di loji kuasa Manjung Quartz itu, Coesite, Berlinite. Ia menyimpulkan bahawa campuran abu arang batu boleh digunakan dalam pembinaan tambak, jalan raya dan mengisi di sebalik mengekalkan struktur.

ABSTRACT

Raw material like coal has been used in Malaysia to generate or produce electricity since 1988.The burning of coal producing excessive waste and directly cause of significant economic and environmental problem. The ash was not managed properly and was dumped in waste pond. Like in Manjung,Perak ,the ash was transfer from the factory to the unproductive land and long-term financial burden. This study focuses on some properties of fly ash, bottom ash and mixture of them from Manjung power plant. The properties are include in characteristics studied are compaction behaviour, strength properties and morphological properties. Strength properties of the samples can be carried out through unconfined compression test (UCT).The physical properties involved the compaction test and grain sieve analysis. Morphology and mineralogy of coal ash mixtures are carried out using the X-Ray Diffraction(XRD) and Scanning Electron Microscope(SEM).The samples undergoes compaction, sealed and cured for 0 and 28 days before further analysis. The friction angle for the XRD laboratory obtained from range 24°-36°.Morphological showed the increasing number of irregular particles and the bonding between the components is strong as age of curing period increase. There are several crystalline compound exists in Manjung power plant such Quartz ,Coesite, Berlinite .It conclude that the coal ash mixtures can be applied in construction embankment ,roads and fill behind retaining structures.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

BA	Bottom Ash
BS	British Standard
CCPs	Coal Combustion Products
FA	Fly Ash
MW	Mega Watt
SEM	Scanning Electron Microscopic
TNB	Tenaga Nasional Berhad
XRD	X-Ray Diffraction
UCT	Unconfined Compression test
PSD	Particle Size Distribution
ICDD	International Centre for Diffraction Data
PDF	Powder Diffraction File

LIST OF SYMBOLS

V	Volume
kN	Kilo Newton
Mg	Mega Gram
MN	Mega Newton
cm	centimetre
mm	Milimetre
μm	Micrometre
kg	Kilogram
w	Moisture Content
w_{opt}	Optimum Moisture Content
ρ_d	Dry Density
$\rho_{d(max)}$	Maximum Dry Density
$\%$	Percent
^{o}	Degree
qu	unconfine compressive strength
su	Undrained Shear Strength