# POSSIBLE USE OF BOTTOM ASH IN EMBANKMENT CONSTRUCTION

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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 due reference is made in the text.

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The above candidate has carried out research for the Master's thesis under my supervision.

Prof. S.A.S. Kulathilake

Signature : ..……. Date :……

## Abstract

Bottom ash is a solid residue byproduct produced by coal burning for electricity generation. In Sri lanka it has not been developed proper system to dispose of this bottom ash other than using small amount for concrete wall block and paving blocks. Usually 75 tons of bottom ash is produced every day with the operation of three number of power generation units in Lakvijaya Power Station. By product of bottom ash is to be a one of a solution for soil scarcity for filling of embankments. For the testing, it is used 3 set of bottom ash each has different origin. To identify characteristics of bottom ash, several tests were done. Particle size distribution, Specific gravity, plasticity, proctor compaction test and permeability test were done to identify basic characteristics. The test results indicated that granular, permeable, pores structure is available for the bottom ash. Specific gravity and the density are quietly low. The compressibility characteristic of bottom ash was determined by one-dimensional consolidation test by using different loading, unloading and reloading sequences for 3 samples. Low compressibility occurred even at higher loads with higher void ratios. Shear strength parameters were assessed for compacted bottom ash by direct shear test under consolidation drained condition. Cohesion is zero and sufficient friction values are available. Toxicity behaviors were analyzed to identify leach out of toxic materials and radiation risks to the environment. Test results indicated that bottom ash favorably suitable for as an embankment construction.

Keywords: Embankment, Bottom ash, Coal power by-product, compressibility of bottom ash, shear strength of bottom ash

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## LIST OF ABBREVIATIONS

| Abbreviation | Description |
|---|---|
| BA | Bottom Ash |
| CBR | California Bearing Ratio |
| EPA | Environmental Protection Agency |
| FA | Fly ash |
| GCS | Geo Composite Soil |
| IAEA | International Atomic Energy Agency |
| ITI | Industrial technology institute |
| MDD | Maximum Dry Density |
| OMC | Optimum Moisture Content |
| PHA | Paddy Husk Ash |
| SEM | Scanning Electron Microscopy |
| TCLP | Toxicity Characteristics leaching Procedure |
| USEPA | United States Environmental Protection Agency |
| UNSCEAR | United Nations Scientific Committee on the Effects of Atomic Radiation |