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CLAY-SLAG-FLY ASH MIXTURE: PERMEABILITY ISSUES

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Abstract— Drainage and permeability has been in center of attention of many researchers. The falling head testing was applied in this study due nature of the used soil. This study incorporates the effect of slag and fly ash changes on the permeability of mixtures. Three percentages of 5, 10, 15% for slag and three fly ash contents of 5, 10, 15% have been used in this study.

Keywords— Permeability, Sand, Lime

I. INTRODUCTION

Permeability value in clayey soil is in the range of 10^{-8} – 10^{-10} m/s [1-12]. However, this is a very low rate value for the permeability value still may cause soil mechanical issues especially in the areas which require higher shear or compressive strength behaviour [13-35]. Addition of by products and cementitious products have shown that they can reduce the permeability of the soil to a lower rate and reduce the associated issues with permeability [36-54]. This study aims to investigate effect of addition of slag and fly ash on bentonite permeability.

II. MATERIALS

The materials which were used in this study were:

a) Clay

Bentonite was applied as clay in the mixture. The Cu of the bentonite was 1.3.

b) Slag

The slag was sourced locally from a Perth supplier.

c) Flyash

The flyash which was employed in this study had pH=11.

III. PERMEABILITY TEST

The tests were run in falling head device. The permeability was measured and recorded for each mixes.

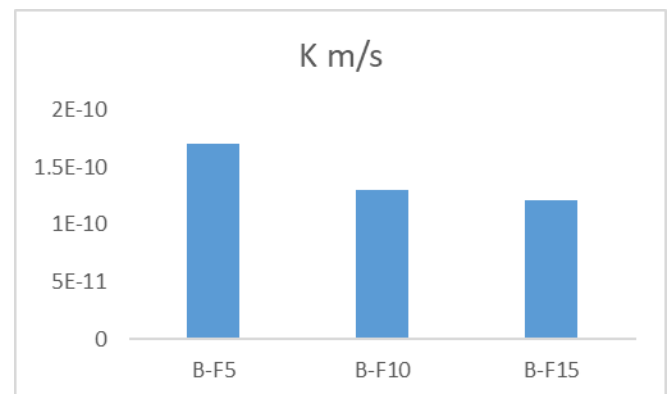


Fig. 1. Permeability of fly ash mixed with bentonite

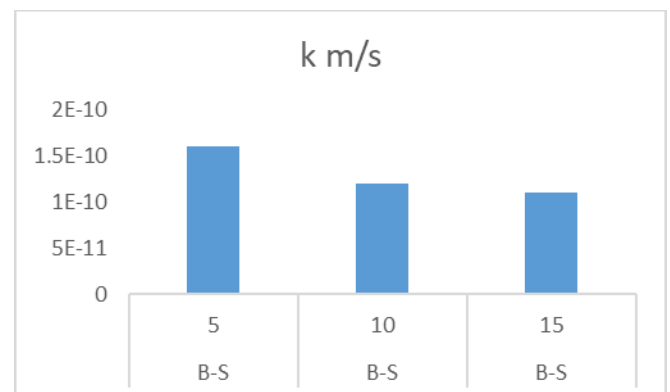


Fig. 2. Permeability of slag mixed with bentonite mixtures

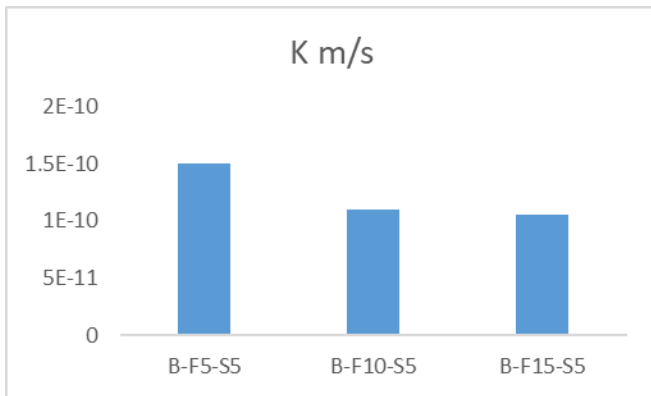


Fig. 3. Permeability of fly ash mixed with 5% slag and bentonite.

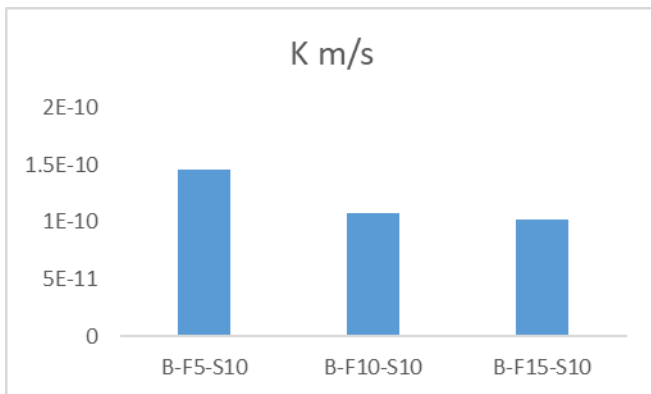


Fig. 4. Permeability of fly ash mixed with 10% slag and bentonite.

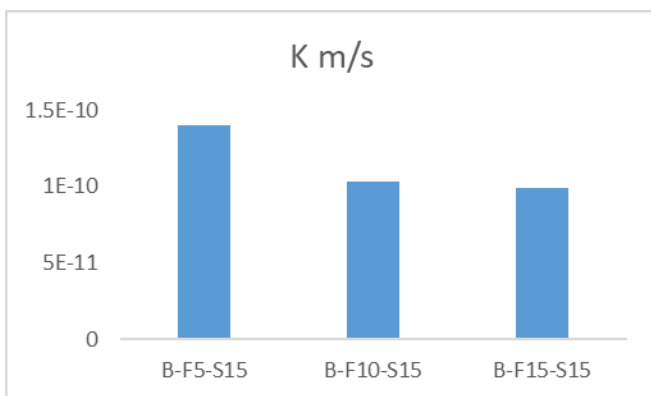


Fig. 5. Permeability of fly ash mixed with 15% slag and bentonite.

IV. CONCLUSION

This study investigated permeability behaviour of fly ash slag mixed with bentonite. In the first pass of the study, a series tests were conducted on mixtures of fly ash and bentonite and then investigation performed on mixtures of slag and bentonite. The results showed that addition of slag and cement to bentonite reduced permeability value. Finally, the results of the final stage of the study showed that mixing both fly ash and slag decreased the permeability of sand.

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