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SOIL STABILISATION USING GLASS POWDER

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Abstract— Stabilisation techniques are used around the world to increase shear or compressive strength and settlement characteristic of soils. This study uses 3 percentages of glass powder (i.e. 2%, 4%, 6%) into soil and investigates the effect of glass powder into unconfined compressive strength (UCS) values. The results showed that application of glass powder is effective to improve UCS behaviour of soil

Keywords— UCS, Glass powder, stabilisation

I. INTRODUCTION

Soil stabilisation using additives is an area of study in geotechnical engineering that improve mechanical behaviour of the soil [1-8]. Sand is one of the most applicable types of soil that is used in construction and infrastructure industries [9-13]. There has been many research in soil stabilisation using different additives. For instance, there has been studies on fibre reinforced soil [14-21], slag stabilized soil [22-25], flyash stabilized soils [26-30], and glass [31-45] their application in different geotechnical structures. This study will investigate how the glass can be effective in improving of strength of specimens.

II. MATERIALS

The used materials were sand which is known as yellow sand with specific gravity (G_s) of 2.65. The used glass powder had a mean size of glass powder was 0.5 mm. Also, ordinary Portland cement type II was utilized in this study as a cementitious agent.

III. COMPACTION TESTING

In order to get the UCS samples, the first stage was to run the compaction tests. The following results were derived. Fig. 1 shows the results of compaction testing that leads to extracting optimum moisture content (OMC) and maximum dry density (MDD) calculations.

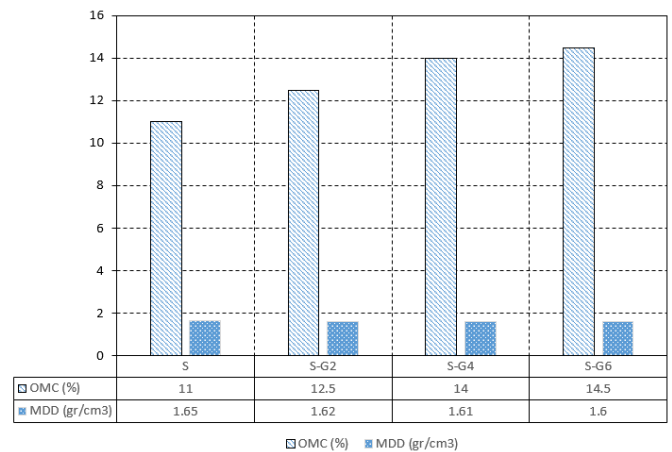


Fig. 1. Effect of glass powder addition on OMC and MDD

IV. UCS

The UCS tests was conducted on the specimens and the following results were derived after 3, 7, 14, and 28 days curing time as shown in Fig. 2, Fig. 3, Fig. 4, and Fig. 5 respectively.

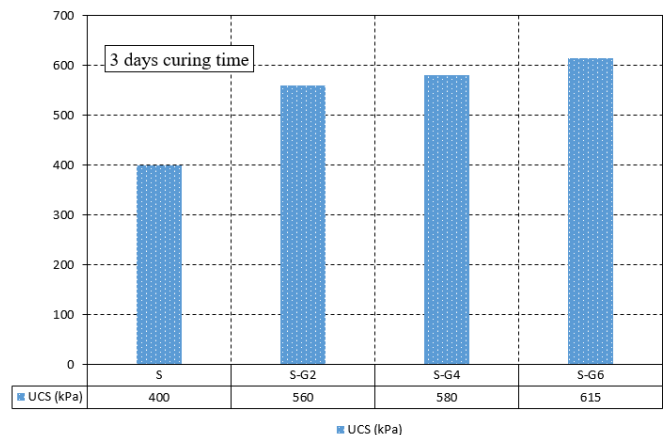


Fig. 2. Effect of glass powder addition on UCS value after 3-days curing time.

As can be seen the trend shows increment by increasing glass percentages for 3 days curing time.

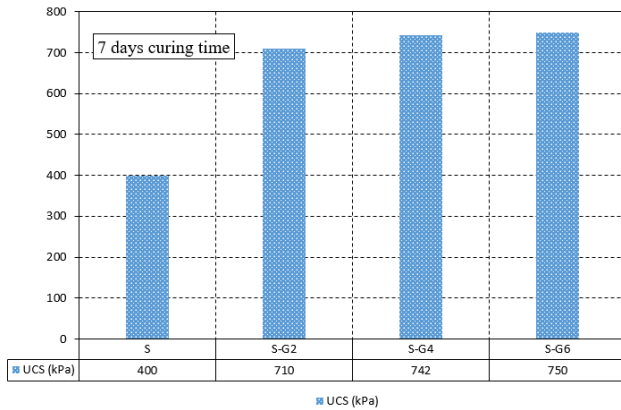


Fig. 3. Effect of glass powder addition on UCS value after 7-days curing time.

As can be seen the trend shows increment by increasing glass percentages for 7 days curing time.

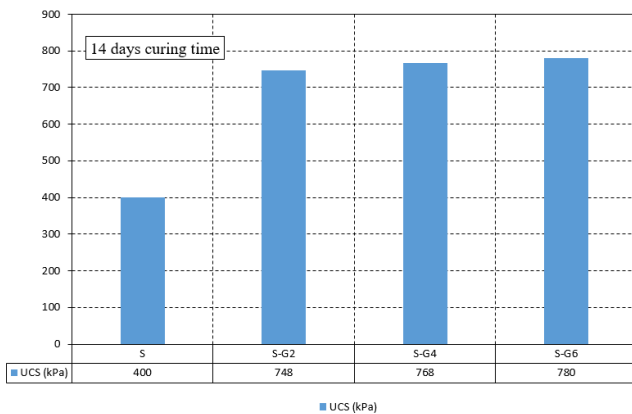


Fig. 4. Effect of glass powder addition on UCS value after 14-days curing time.

As can be seen the trend shows increment by increasing glass percentages for 14 days curing.

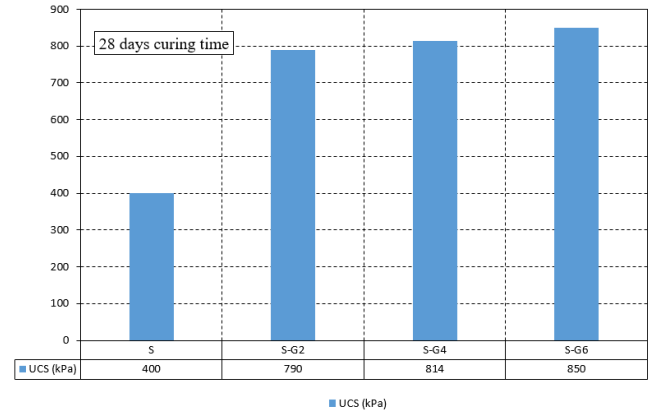


Fig. 5. Effect of glass powder addition on UCS value after 28-days curing time.

As can be seen the trend shows increment by increasing glass percentages for 28 days curing.

V. CONCLUSION

As the analysis showed addition of glass powder in soil improves the UCS value of the cemented sand. Addition of glass powder shown effective in increasing the OMC and reducing the MDD.

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