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TAJUK PROJEK : USING RECYCLE CERAMIC TILES AS REPLACEMENT COARSE AGGREGATE IN CONCRETE

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USING RECYCLE CERAMIC TILES AS REPLACEMENT COARSE AGGREGATE IN CONCRETE

INTRODUCTION

Nearly every community in nearly every industrialized or industrializing country is dependent on aggregate resources (sand, gravel, and stone) to build and maintain their infrastructure. Indeed, even agrarian communities depend on well-maintained transportation systems to move produce to markets. Unfortunately, aggregate resources necessary to meet societal needs cannot be developed without causing environmental impacts.

According to Mario (2014), ceramic waste is potential to partially substitute both natural aggregates and binder. It can be used in the creation of concrete due to its properties. It is durable, hard and highly resistant to chemical, physical and biological degradation. According to M. Daniyal and S. Ahmad (2015), using ceramic tiles in concrete is effective regarding to reducing the costs of concrete and environmentally cleans along with decreasing the use of natural materials. Using coarse waste ceramic tiles aggregate in the concrete mix lead to a considerable reduction in the workability. The use of ceramic tile in the concrete enhanced the flexural strength considerably.

PROBLEM STATEMENT

According to Kulkarni (2012), we are depleting our own natural resources and causing harm to environment by taking aggregates. The demand of construction materials for project is increasing. Therefore, there is a need to explore alternative building materials that can be recycled. Ceramic tiles are often discarded as waste after defined as useless. Yet it can be recycled and can be used as a construction material in today's world that seeks alternative building material that is economical, environmentally sustainable and offers the same consistency as that of a regular aggregate (S.Jalali, 2010). Ceramic wastes can be used safely with no need for extreme change in production and application process.

RESEARCH METHODOLOGY

A research methodology is the method that used which covers the preparation of experiments, the concrete test, and therefore based on observation the result is carried out. The proper planning and structure study of research methodology is crucial were as it serves as a guide to achieving the objectives and scopes of the study. The preparation of these experiments includes crushing ceramic tiles to the size of 20 mm, concrete mixing and others are carried out in the laboratory. Some concrete tests will be carried out in this research one of them is the Compressive Strength test, Slump test and Water absorption test. Compressive Strength test and Slump test was adapted to experiment the strength and properties of ceramic tiles aggregate concrete. Various compressive tests is tested and analyzed for finding the optimum partial replacement limit of ceramic tiles to replace the coarse aggregate.

IMPROVEMENT SUGGESTION

The ceramic tiles aggregate is used as partial replacement of coarse aggregate in concrete with a certain percentage which is 5%, 15% and 35%. From the compressive result, the maximum to add the ceramic tiles cannot exceed more than 15%. This is because, 15% replacement of ceramic tiles in concrete has the highest strength for 14 days which is reached conventional concrete compressive strength levels (15 N/mm^2 - 28 N/mm^2).

BENEFIT / SIGNIFICANCE

Construction industry

The party in the construction industry will find out about the effectiveness of ceramic waste as replacement of coarse aggregate in building construction. The industry is well aware of the wastage of construction and how the disposal management of the wastage is like, so the party involved in construction especially site supervisor and contractor must applied this research to prevent increment of wastage. If there are party who are unaware of the hazardous of the wastage, this research could alert them to the effect of ceramic waste to the environment.

Society

The results of this research will make the community feel safer as the construction industry begins to recycle the construction waste. Therefore, they feel safer and comfortable as there is no need to quarry to get the coarse aggregate and no fine dust from ceramic will be release as the ceramic waste will replace the coarse aggregate.

Academic

Academics can make the results of this study either as a reference to a relevant study or as a reference to a lesson. Academics will also gain a deeper understanding of replacement of coarse aggregate after reading this research.

HOW TO IMPLEMENT / METHOD OF USE

The use of concrete with the replacement of used ceramic tiles can be used for structural or non-structural work for replacement of not more than 15% only. The use of used ceramic tiles is not suitable for use in concrete structures that require high strength.

CONCLUSION

In conclusion, the main objective of this study was the analysis of strengths and affordability of concrete made using ceramic tiles wastes as partial replacement of coarse aggregates. The purpose was to find the use of such wastes which were only growing on one side, and a solution to the natural aggregates scarcity and cost, on the other side. It is suggested that the solution to this dual problem would ease the environment protection. The study first checked the suitability of natural aggregates used for controlling sample, and the same for ceramic wastes as proposed new coarse aggregates. Finally, both controlling samples and samples with partial replacements of fine aggregates by ceramic tiles wastes were manufactured and tested after 7, 14 and 28 days.

APPENDIX

Figure 1: Concrete samples that has been replaced by recycle ceramic tiles with 5% replacement.

Figure 2: Condition of concrete samples after Compressive Strength test.