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عنوان البحث للرسالة او الاطروحة:

Durability of No Fine Concrete Produced by Using Demolished Concrete as Recycled Coarse Aggregate

متانه الخرسانه الخاليه من الرمل والمنتجة بواسطه تدوير الخرسانه التالفه كركام خشن

عناوين البحوث المستلة:

1. Some Properties OF No-Fine Concrete Produced by Using Demolished Concrete as Recycled Coarse Aggregate.

2. Effect solution aggressive on No Fine Concrete Produced by Using Demolished Concrete as Recycled Coarse Aggregate.

تقدير المناقشة : جيد جدا عالي

Abstract : **مستخلص البحث :**

The aggregates typically represent (70-80) % of concrete volume and play a substantial role in different concrete properties such as workability, strength, dimensional stability and durability. The use of concrete in structures consumes millions of tons of aggregates. Earth is the source of the aggregates (either natural or crushed), getting on these amounts would have an adverse effect on the environment. Furthermore, demolishing concrete structures would aggravate the problem. Therefore, it becomes necessary to recycle the rubble concrete and use it as coarse aggregate in new concrete mixes that would lead to reduce the consumption of natural aggregate and the amount of concrete waste that ends up in landfills.

On the other hand concrete constructions in Iraq suffer from many problems, some of those are concerned with the deficiency of sand satisfying the sulfate requirements of the standard specifications. One of the solutions is to use no fines concrete that is composed of gravel and cement only without any sand. This choice gives us another benefit in addition to getting rid of the sand and its sulfate problem, which is producing lightweight concrete having good thermal insulation needed so much in the Iraqi hot climate.

The aim of this study is to investigate the effect of using recycled concrete as coarse aggregate on durability of no fines concrete. The variables considered in this study are cement to aggregate ratio (1:5 and 1:7), type of aggregate gradation (single size 20mm and graded aggregate 20mm) and type of aggregate (natural crushed and demolished concrete aggregate). The workability was kept constant for all mixes; hence superplasticizer was used to get homogenous and workable mix.

A total of 216(100*100*100) mm cubes for compressive strength test, 120 (100*200 mm) cylinders for splitting strength test, water absorption, oven dry density and fresh density, 24(100*100*400) mm prisms for flexural strength test, 24(75*75*285) mm prisms for dry shrinkage test, and 16 (75*30) mm cylinders for thermal conductivity test were cast and cured to the required age of test.

The results showed that use of demolished concrete as recycle coarse aggregate in no fine concrete lead to decreasing the workability of no fine concrete compared with natural coarse aggregate depending on maximum size of coarse aggregate and cement to aggregate ratio .The average decrease in flow test, compaction factor and fresh density were in range (1.6-3.18) %, (1.15-2.25) % and (2.85-10.9) % kg/m^3 respectively. Moreover a decreasing oven dry density of specimens at 28 days, where the average decrease in oven dry density was in range (5.12-8.8) % kg/m^3 compared with normal coarse aggregate. But the value of drying shrinkage at 90 days, thermal conductivity and water absorption for specimens at 28 days for no fine concrete produced by using rubbles concrete as recycle coarse aggregate more as compared with no fine concrete produced

with natural coarse aggregate, where the shrinkage and thermal conductivity were in range (19.4-22.1) % mm/mm $\times 10^{-6}$, (12.8-21.4) % and (18.75-23.8) % respectively.

The test results indicate noticeable decrease in compressive strength, splitting tensile strength and flexural strength when demolished concrete was used as coarse aggregate. The decrease in the compressive strength for specimens at 180 days, splitting tensile strength and flexural strength for samples at 28days ranged between (25.7-27.7) %, (20.4-28.6) % and (20-24.9) % respectively. The compressive strength of specimens immersed in acidulous solution for 180 days was reduced in range (34.9-40.9) % MPa as compared with specimens made with natural coarse aggregate.