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EXPERIMENTAL STUDY OF CONCRETE WITH EXCAVATED SOIL AS A FINE AGGREGATE

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Abstract: As we know the sand plays the important role in mixing of concrete and also the ban on river sand is affecting to the construction industry. Hence the increasing demand of sand makes the Ecological Imbalance, so it need to find some alternative material to replace the sand. In Experimental study, the fine aggregate in concrete will be replaced by Excavated soil. Standard test specimens were cast separately for conventional concrete and excavated soil using concrete.

Keywords: Compressive Strength, Concrete, Excavated Soil, Replacement, Sand.

I. INTRODUCTION

Concrete is the most commonly used construction material in construction industry. Concrete is used for many applications such as superstructures, sub structures, waste water and water treatment facilities, parking structures, floor construction and Exterior surface.

Fine aggregate is the basic component for making concrete. Mining of river sand causing many problems deepening of the river courses, loosing water retaining sand strata, disturbs the aquatic life, lowering the underground water table etc. Nowadays good sand is not readily available. So it is a time to find some substitute to natural river sand.

The alternatives for river sand are granite powder, iron powder, copper slag, wood waste, fly ash, waste foundry sand, brick waste, quarry waste, crushed concrete waste etc.

The idea of the investigation of our project is to use the excavated soil available at a construction site and unused soil as a fine aggregate in concrete because this will conserve the natural resources and protect the ecological imbalance on environment.

The excavated soil will be taken from construction site of MIDC, Hingna area.

II. EXPERIMENTAL PROGRAMME

2.1 Material: The materials cement, river sand, coarse aggregate and excavated soil was used in this investigation. The ordinary Portland cement of grade 43 and crushed stone aggregates of 10 mm size were used. The specific gravity of sand and excavated soil is 2.75 and 2.13.

2.2 Sieve analysis: - The grading and size of aggregates is important parameters in concrete mix. The sieve analysis was conducted to determine the particle size distribution of excavated soil and river sand. Coefficient of curvature in sand and soil is 1.2 and 0.703 respectively

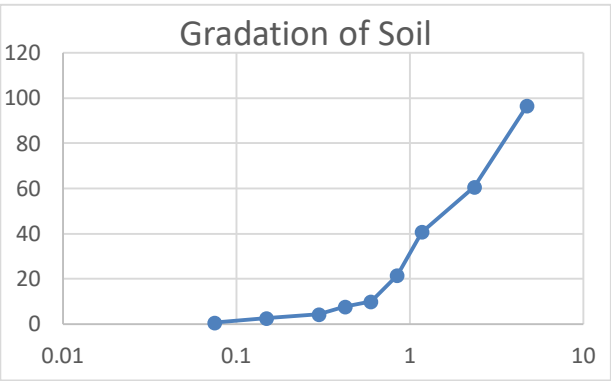

Fig.1

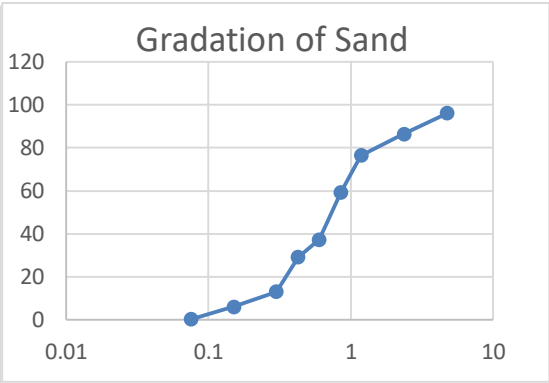

fig 2

2.3 Liquid limit and Plastic limit: Liquid Limit is the water content at which soil changes from a plastic to a liquid state, when the soil specimen is just fluid enough for a groove to close when jarred in a specified manner. Plastic Limit is the water content at the change from a plastic to a semisolid state. So the water content in liquid limit at 25 blows is 28% and water content in plastic limit is 15%

2.4 Preparation of specimens: The conventional concrete mix and excavated soil mix was prepared. In the excavated soil mix, the river sand partially replaced 10%, 25% and 50% by the excavated soil. The various concrete specimens based on the test and trial basis were cast for the cube of size 150 mm ×150 mm × 150 mm. The samples were cured by water for 28 days. After curing the specimens were taken from the water and the surface was wiped out. The testing was conducted on the various concrete specimens.

2.4 Testing of specimens: The compressive strength test was conducted for normal concrete and excavated soil concrete specimens as per IS 516(1959). Compressive strength was taken for the 7, 14 and 28 days cured cubes and it is done in compression testing machine (CTM).

III. EXPERIMENTAL STUDIES

3.1 MATERIALS PROPERTIES:

3.1.1 CEMENT:

Ordinary Portland cement of grade affirming to IS 12269-1987 was utilized.

3.1.2 SAND:

The sand used in the examination was passed from the sieve 4.75 mm and retained on 75 micron sieve.

3.1.3 AGGREGATE:

The sieve analysis test was conducted as per IS 383 (1970). The aggregate was passed from sieve 20 mm and retained on sieve size 10 mm.

3.1.4 SOIL:

The sieve analysis test was conducted as per IS 383 (1970). The ssoil used in the examination was passed from the sieve 4.75 mm and retained on 600 micron sieve.

3.2 MIX PROPORTION:

The mix proportion for M20 grade concrete is utilized in the present work. It is planned as per IS 10262-1982.

3.3 EXPERIMENTAL INVESTIGATION:

The experiment was directed to find the increased compressive strength. The test were directed at 7, 14 and 28 days of period.

IV. RESULT

Table : Strength differences as per different curing methods

Sr. No.	Grade of concrete	Materials used	Compressive strength (N/mm^2)			
			Material Combinations	7 Days	14 Days	28 Days
1	M20	Conventional concrete	(Cement+ Sand + Aggregate)	13.1	18.2	19.5
2	M20	10% replace sand by soil	(Cement + 90%Sand + 10% soil+ Aggregate)	13.3	18.8	20.2
3	M20	25% replace sand by soil	(Cement + 75%Sand +25% soil+ Aggregate)	16.88	23.86	25.6
4	M20	50% replace sand by soil	(Cement + 50%Sand +50% soil+ Aggregate)	11.5	16.25	17.44

V. CONCLUSION

So after the Testing on concrete it is found that:

- In 10% of replacement, Strength is increased by 4.5%.
- In 25% of replacement, Strength is increased by 28.2%.
- In 50% of replacement , Strength is decreased by 12.2%

The compressive strength of the concrete is increased when river sand is replaced **10% & 25%** by the excavated soil, as a fine aggregate.

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