Effect of Replacement of Potable Water by Treated Waste Water on Compressive Strength of Concrete

With it is interesting to note that there was a decrease in the compressive strength of the design mix for the replacement of Potable Water by Treated Waste Water. Hence with 60% replacement of Natural Sand(NS) by Foundry Sand (FS) ,40% replacement of Course Aggregate (CA) by Blast Furnace Slag (BFS) and with usages of potable water more reliable compressive strength results are out.

9. Cost Analysis

Cost Analysis of M20 Grade Conventional concrete

Sr. No.	*Material*	*Quantity*	*Rate in Rs.*	*Unit*	*Amount*
1	Cement	5.16	360.00	Bags	1857.60
2	Natural Sand	0.761	2135.65	Cum.	1625.23
3	Foundry Sand	-	-	-	-
4	Aggregate (1/8)	0.311	629.11	Cum.	195.65
5	Aggregate (3/8)	0.298	629.11		187.47
6	Blast Furnace Slag (1/8)	-	-	-	-
7	Blast Furnace Slag (3/8)	-	-	-	-
8	Chemical	2.58	120	Liters	309.60
TOTAL					**4175.56**

Cost Analysis of Design Mix (With Replacement)

Sr. No.	*Material*	*Quantity*	*Rate in Rs.*	*Unit*	*Amount*
1	Cement	5.160	360.00	Bags	1857.60
2	Natural Sand	0.304	2135.65	Cum.	650.09
3	Foundry Sand	0.457	33.00	Cum	15.07
4	Aggregate (1/8)	0.187	629.11	Cum.	117.39
5	Aggregate (3/8)	0.179	629.11	Cum.	112.48
6	Blast Furnace Slag (1/8)	0.124	47.00	Cum.	5.85
7	Blast Furnace Slag (3/8)	0.119	47.00	Cum.	5.60
8	Chemical	2.580	120.00	Liters	309.60
TOTAL					**3073.69**

A) Cost of 1 (ONE) Paver Block Casted in Laboratory

a. Paver Blocks in Conventional Concrete =Rs 2.92/-
b. Paver Blocks with replacement in ingredients= Rs. 2.15/-

B) Cost of 1 (ONE) Paver Block available in Market

a. Paver Blocks (Rubber Mould)=Rs 3.76/-
b. Paver Blocks (Normal Mould)=Rs 3.48/-

10. Conclusion

Chemical and physical properties of both Blast Furnace Slag (BFS) and foundry sand (FS) are similar to properties of natural course and fine aggregates. The primary characterization indicates the foundry sand have a enough suitability to utilize as a fine aggregate in production of concrete to enhance the strength and durability of the concrete by saving the natural resources like sand which is day by day become scared.

Evan 80% replacement by Blast Furnace Slag (BFS) and foundry sand gives appropriate compressive strength hence we can save valuable natural resource without much compromising in the strength.

The demand for aggregates is increasing rapidly and so as the demand of concrete. Thus, it is becoming more important to find suitable alternatives for aggregates in the future. Utilization of Blast furnace slag and foundry sand in concrete (as a replacement of Fine and Course Aggregate) might prove an economical and environmental friendly solution in local region. The results showed that it has properties similar to natural aggregates and it would not cause any harm if incorporated into concrete.

It can be conclude that the compressive strength of concrete with 60% replacement Natural Sand (NS) and 40% replacement Course Aggregate (CA) with potable water was increases by 7.137 N/mm^2 (35.69 %) than the design compressive strength of Convention concrete (20 N/mm^2), where as the compressive strength was increased by 5.166 N/mm^2 (25.83 %) while treated water was used instead of potable water.

It can be concluded that the cost of M20 grade conventional concrete is Rs. 4175.56/- per m^3 and the cost of concrete with 60% replacement of Natural Sand(NS) by Foundry Sand (FS) & 40% replacement of Course Aggregate (CA) by Blast Furnace Slag (BFS) is Rs. 3073.69/- per m^3.

Similarly, if paver blocks are casted in laboratory with conventional concrete, then obtained cost was Rs 2.92/- per paver block and if paver blocks are casted in laboratory with concrete with 60% replacement Natural Sand (NS) and 40% replacement Course Aggregate (CA), then obtained cost was Rs 2.15/- per paver block. Whereas the cost of paver block available in market is Rs. 3.48/- per paver block. With reference to the observations of the present experimental work it can conclude that there was a saving of Rs. 1101.87 /- per m3 or saving of Rs 1.33 /- per paver block and also saving of natural resources like Fine Aggregate and Course Aggregate.

Therefore from the above observations finally it can be concluded that the replacement of fine and course aggregate by Blast furnace slag and Foundry sand was safe and economical.

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