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EFFECT OF ADMIXTURE IN THE PARTIAL REPLACEMENT OF NATURAL SAND BY CRUSHED SAND IN CONCRETE

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Abstract- **Sand is fundamental solid making development material required in vast amounts. Thus, in the Present situation, it is important to locate the most reasonable substitute for sand, simple to create and has all the required characteristics for use in concrete. Produced sand Crushed sand is one among such materials to supplant stream sand, which can be utilized as an elective fine total in mortars and cements. Two fundamental blends were chosen for regular sand to accomplish M 25 review concrete. The proportional blends were gotten by supplanting characteristic sand by C-sand halfway. Super plasticizers are usually used to accomplish the workability. The test outcome demonstrates that C-sand can be utilized adequately to supplant regular sand and supplant of water super plasticizer in concrete. In the exploratory investigation of quality attributes of solid utilizing C-sand as fine total and** Sulphonated melamine-formaldehyde condensate **as water it is discovered that there is increment in compressive quality of cement.**

1. INTRODUCTION

Because of fast development in development movement, the utilization of cement is expanding each year. This outcomes in unreasonable extraction of regular totals. Normal cement, regularly, contains around 12 percent concrete, 12 percent blending water, and 80 percent total by mass. This implies, notwithstanding 1.52 billion tons of bond, the solid business is expending every year 9 billion tons of sand and shake together with one billion tons of blending water. The 11.6 billion tons-a-year solid industry is in this manner the biggest client of common assets on the planet

Sand is the one of fundamental constituents of solid making which is around 40 % of volume of cement utilized as a part of development industry. Fine particles underneath 600 microns must be at least 32 % to half to make solid will give great outcomes Normally particles are absent in stream sand up to required amount. Burrowing sand, from waterway bed in overabundance amount is dangerous to condition. The profound pits delved in the waterway bed, influences the ground water level.

Disintegration of adjacent land is likewise because of exorbitant sand lifting. Additionally, great quality sand may must be transported from long separation, which adds to the cost of development. Keeping in mind the end goal to full fill the prerequisite of fine total, some elective material must be found. The least expensive and the simplest method for getting substitute for regular sand is by smashing normal stone to get counterfeit sand of wanted size and grade which would be free from all polluting influences is known as Crushed sand.

This paper exhibits the consequences of trial work conducted on performance of concrete made with made sand as fine total. The regular sand was supplanted with made sand by four extents (i.e. 0% 10%20%, 30%,40%,50% 60%,70% and 80%).The impact of cement made with various extents of Crushed sand has been talked about. Super plasticizer utilized as a part of this examination is ConplastSP435 which is Sulphonated melamine-formaldehyde condensate based one and provided as a dark colored fluid in a split second dispersible in water. Advantages of using Conplast SP435 super plasticizer are Improved Quality of Concrete Higher Cohesion Chloride Free Improved Workability Increased Strength.

2. OBJECTIVE

To research the properties of made sand,

impact of super plasticizer and contrasting and the normal sand and utilizing as a fractional swap for fine total. What's more, to improve swap rate for normal sand by produced sand in concrete by contrasting the compressive quality outcome by expansion of super plasticizer

3. EXPERIMENTAL INVESTIGATION

3.1MATERIALSUSED

Common Portland Cement (OPC) 43 review fitting in with IS 8112. Locally accessible waterway sand was utilized as fine total. Pounded rock coarse total of size 12.5mm was utilized. Convenient water was utilized for blending of cement and curing reason. Produced Sand Super Plasticizer

3.1.1Cement

Portland pozzolanic concrete 53 review fitting in with IS8112– 1989, and particular gravity of concrete is observed to be 3.15. The properties of bond given in Table 1

Table -1 Properties Of Cement

Mechanical Properties of Cement Compressive Strength MPa		
Days	Strength N/mm^2	As IS standard Strength N/mm^2
3	23	16
7	32	22
28	54	33

Chemical properties of cement						
Oxide composition	Cao	Sio2	Al2O3	Fe2O3	SO3	MgO
Percent	64.1	22.62	6.01	3.92	1.64	0.82

3.1.3 Fine Aggregative

Locally accessible waterway sand having mass thickness 1762 kg/m^3 is utilized and the particular gravity 2.62 and fineness modulus of waterway sand is 2.65

3.1.3 Crushed sand

Made sand is a reason made, fine smashed total created under controlled conditions from an appropriate sound source shake. It is intended for use in solid, black-top and other particular items. General crusher fines and sand coming about because of delicately pulverizing disintegrated stone or pitifully solidified sandstone rocks are not thought to be produced sand. The last are typically named normal sands of leftover inception. C-sand is replaced is fully replacement of river sand. The bulk density of crushed Sand1790 kg/m^2 and the specific gravity 2.9 and fine nesss modulus of river Sand is 2.78. The comparision of natural sand and C-sand is shown in table2 and table 3.

Table 2 Properties of Natural sand and crushed sand

S.N0	Property	Natural Sand	Crushed Sand
1	SpecificGravity	2.65	2.72
2	Finenessmodulus	2.62	2.65
3	Bulk Density KN/m^3	14.74	18.75

Table 3 Sieve Analysis Of River Sand & C –Sand

S.NO	Sievesize (mm)	%Passing		
		Zone-1	Natural Sand	C-Sand
1	4.75	90-100	98.7	96.2
2	2.36	60-95	93	89.2
3	1.18	30-70	74	64.8
4	0.6	15-34	51.1	42.4
5	0.3	5-20	18.5	22.6
6	0.15	0-10	5.6	8.2

Component	Results	Requirements
Fineness(m2/kg)	5	<10%
Initial setting time (Minutes)	102 mins	Minimum30mins
Final setting time. (Minutes)	535 mins	Maximum600hrs
Standard consistency	35%	----
Soundnes	2 mm	Maximum10mm

3.1.4Coarse Aggregate

Damaged rakish total with most extreme grain size of 20mm and minimized was utilized & having mass thickness 2770 kg/m^3. The particular gravity and fineness modulus was observed to be 2.65 and 2.85 individually. Fresh potable water, which is free from acid and organic substance, was used for mixing the concrete.

3.1.5 Super Plasticizer

Super plasticizer utilized as a part of this examination is Conplast SP430 which is Sulphonated melamine-formaldehyde condensate based one and provided as a darker fluid quickly dispersible in water. The physical properties of super plasticizers given underneath table 4Sulphonated melamine-formaldehyde condensate

Table 4 Physical properties of Super Plasticizer

SI.NO	PHYSICALTESTS	ANALYSIS
1	SpecificGravity	1.24
2	Chloridecontent	0.05
3	Air entrainment	12.84lb/ft3

3.2 CONCRETE MIX DESIGN FOR M 25 GRADE FOR ONE M^3 CONCRETE INRATIO1:1.44:3. 2ATW/C: 0.52

Table 5 Concrete Mix Proportions For Onem for zero percentage of super plasticizer

Material	Cement kg	Water Lit	Sand Kg		Coarse Aggregate Kg
Total Quantity	455	236.6	465		1055
Total Proportion			Natural Sand	C-Sand	
	1	0.52	1.46		3
0% C-Sand (CS)	455	236.6	655	-	1456
10% C-sandCS1)	455	236.6	65.5	589.5	1456
20% C-sand(CS2)	455	236.6	131	524	1456
30% C-sand(CS3)	455	236.6	196.5	458.5	1456
40% C-sandx(CS4)	455	236.6	262	393	1456
50% C-sand(CS5)	455	236.6	327.5	327.5	1456
60% C-Sand(CS6)	455	236.6	393	262	1456
70% C-Sand(CS7)	455	236.6	458.5	196.5	1456
80% C-Sand(CS8)	455	236.6	524	131	1456

Table 6Mixing of super plasticizer in water

S.NO	WATER	SUPER PLASTICIZER
TYPE1	**236.6**	**0**
TYPE2	**236.6**	**1022**
TYPE3	**236.6**	**2974**

Table 7 TYPE1 Mixing of C-sand

S.NO	Type1	% of C- sand addedin C.A	%of super plasticizers added in Water
1	C	NIL	NIL
2	C1	10	NIL
3	C2	20	NIL
4	C3	30	NIL
5	C4	40	NIL
6	C 5	50	NIL

7	C6	60	NIL

S.NO	TYPE3	% of C-sand added in C.A	% of super plasticizers added in F.A
1	CSP	NIL	1.55
2	CSP1	10	1.55
3	CSP2	20	1.55
4	CSP3	30	1.55
5	CSP4	40	1.55
6	CSP5	50	1.55
7	CSP6	60	1.55
8	CSP7	70	1.55
9	CSP8	80	1.55

8	C7	70	NIL
9	C8	80	NIL

Table 8TYPE 2 Mixing of C-sand and Super Plasticizer (0.5%)

S.NO	Type2	%of C-sand added in C.A	% of super plasticizers added in Water
1	CS	NIL	0.55
2	CS1	10	0.55
3	CS2	20	0.55
4	CS3	30	0.55
5	CS5	40	0.55
6	CS6	50	0.55
7	CS7	60	0.55
8	CS8	70	0.55
9	CS9	80	0.55

Table 9 TYPE3 Mixing of C-sand and Super Plasticizer (1.55%)

3.3 COMPRESSIVE STRENGTH MEASUREMENTS

The solid 3D shapes of size 150 mm×150mm×150mm were threw utilizing 1:1.48: 3 blend with a W/C proportion of 0.5 with produced sand. Amid throwing the 3D shapes were filled by three layers and each layer is compacted by packing bar by giving 35 stocks. Following 24 hours the examples were remolded and subjected to curing for 7, 14 and 28 days in versatile water.

It additionally expressed in IS 516-1959 that the heap was connected without stun and expanded constantly at the rate of around 140 Kg/sq cm/min until the point when the protection of example to the expanding loads separates and no more noteworthy load can be managed. The greatest load connected to the example was then recorded according to May be: 516-1959. The testing of shape and barrels under pressure were appeared

The compressive quality was figured as takes after:

Compressive strength (MPa) = Failure load / cross sectional area.

After curing, the specimens were tested for compressive strength using compression testing machine of 5000KNcapacity.

The results and comparisons are shown in table 10,

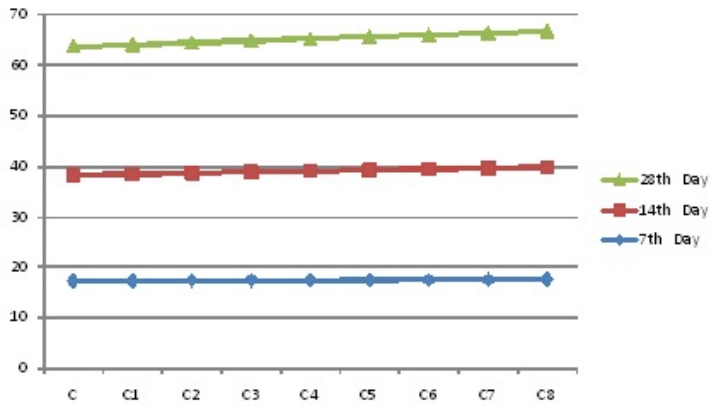
S.NO	TYPE1	COMPRESSIVE STRENGTH(N/mm2)		
		7th Day	14th Day	28th Day
1	C	17.21	21.24	25.28

2	C1	17.24	21.32	25.42
3	C2	17.28	21.54	25.64
4	C3	17.31	21.67	25.81
5	C4	17.35	21.82	25.99
6	C5	17.38	21.97	26.17
7	C6	17.42	22.12	26.35
8	C7	17.45	22.27	26.53
9	C8	17.49	22.42	26.71

S.NO	TYPE1	COMPRESSIVE STRENGTH(N/mm^2)		
		7th Day	14th Day	28th Day
1	CS	18.24	21.26	26.12
2	CS1	18.32	21.34	26.24
3	CS2	18.45	21.64	26.32
4	CS3	18.55	21.79	26.43
5	CS4	18.65	21.98	26.53
6	CS5	18.76	22.17	26.63
7	CS6	18.86	22.36	26.73
8	CS7	18.97	22.55	26.83
9	CS8	19.07	22.74	26.93

S.NO	TYPE1	COMPRESSIVE STRENGTH(N/mm2)		
		7th Day	14th Day	28th Day
1	CS	17.36	21.34	25.34
2	CS1	17.44	21.46	25.46
3	CS2	17.56	21.64	26.54
4	CS3	17.65	21.78	26.98
5	CS4	17.75	21.93	27.58
6	CS5	17.85	22.08	28.18
7	CS6	17.95	22.23	28.78
8	CS7	18.05	22.38	29.38
9	CS8	18.15	22.53	29.98

Industry shall start using the crushed sand to full extent as alternative; reduce the impacts on environment by not using the river sand. Presently thereisaneedfor20,000 units of sand per day for the private and public construction works. But the supply from the currently functional sand quarries does not meet the demand. In this situation, an alternative to the natural sand The requirement of cement is reduced considerably by using the crushed sand. The applications of concrete will necessity at the use of High Performance Concrete in corporating new generation chemical admixtures (PCE based superplasticizers) and available mineral admixtures. The work ability of concrete can be increased by addition of super plasticizer. However, very high dosages of SP tend to impair the cohesiveness of concrete. Slump loss can be reduced by using the chemical admixtures. However, effectiveness is higher for super plasticizer concrete.



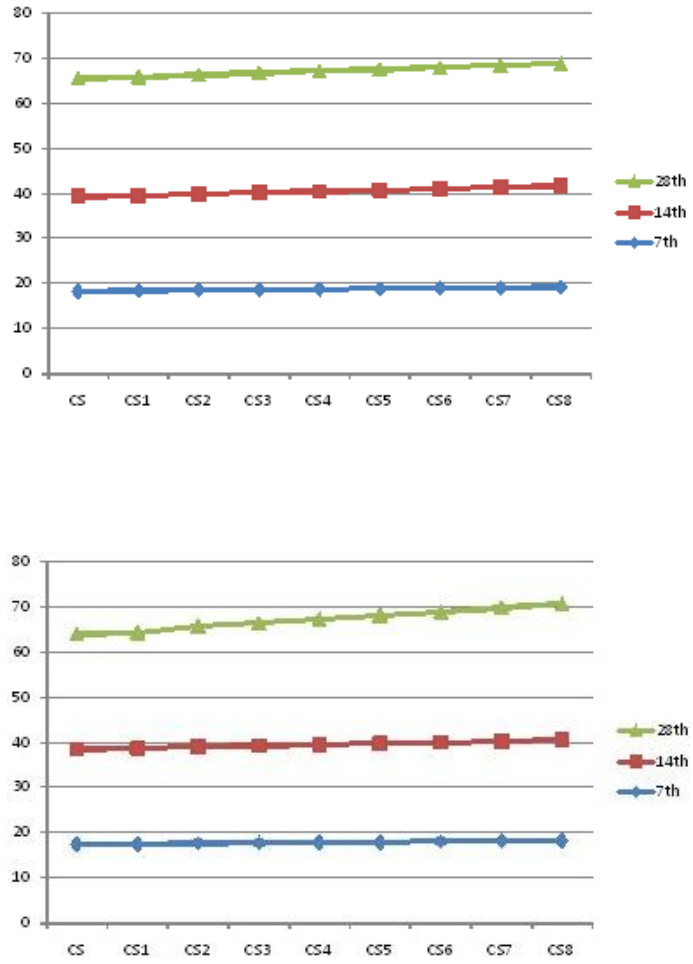


Fig.3Compressive strength(7^{th},14^{th},28^{th}day)

The Local Authorities Government, shall encourage the use of Crushed sand in Public Construction Works, if possible, shall make mandatory to use Crushed sand wherever available with immediate effect. The maximum compression strength of 42.84N/mm^2 on 28^{th} The Government Shall come out with, Policy on Sand –day testing. So, the optimum percentage of replacement of natural sand by crushed sand is 60%.

4. CONCLUSIONS

From the cube results it is found strength for 7, 14 and 28 days of curing for the concrete cubes keeps on increasing with the percentage of crushed sand replacement up to 80%, beyond 80%, strength decreases. The overall strength of concrete linearly increases from 0%, 10%, 20%, 30%, 40%, 50%, 60% 70% & 80% start decreasing above 80% replacement of natural sand by crushed sand. The compressive From the above experimental results it crushed sand can be used as partial replacement for the natural sand, and the compressive strength are increased as the percentage of crushed sand is increased up to optimum level. The optimum percentage of replacement of natural sand by crushed sand is 80%. Considering, the acute shortage of river coming on quality of river sand, high cost, greater impact on road damages and environmental effects. The Construction Industry shall start using the crushed sand to full extent as alternative; reduce the impacts on environment by not using the river sand presently there is a need for 20,000 units of sand per day for the private and public construction works. But the supply from the currently functional sand quarries does not meet the demand. In this situation, an alternative to the naturals and The requirement of cement is reduced considerably by using the crushed sand. The applications of concrete will necessitate the use of High Performance Concrete incorporating new generation chemical admixtures (PCE based super plasticizers) and available mineral admixtures. The work ability of concrete can be increased by addition of super plasticizer. However, very high dosages of SP tend to impair the cohesiveness of concrete. Slump loss can be reduced by using the chemical admixtures. However, effectiveness is higher for super plasticizer concrete The Local Authorities/PWD/Government shall encourage the use of Crushed sand in Public Construction Works, if possible, shall make mandatory to use Crushed sand wherever available with immediate effect. The Government Shall come out with, Policy on Sand – encourage the industry people to set up more number of Sand crushing Units across the all Districts, States to meet the sand requirements of the Construction Industry Crushed Sand can be produced to fall in the desired Zone according to our requirement. This can definitely ensure the quality of concrete the utilization of crushed sand leads to eco friendly construction and

economic construction. A capital investment in the range of Rs.1croreto5crore becomes vital for the crushing units to buy the machinery. The state government of Tamil Nadu grant of at least 30% subsidy for the purchase of the machinery.

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