

No-Fines Concrete with Coir Fiber

Aniket S Pateriya, Ajay R Chandurkar
 Prof Ram Meghe Institute of Technology and Research, Badnera-444607

Abstract:- No-fines concrete is a form of lightweight porous concrete, obtained by eliminating the sand from the normal concrete mix. The main advantages of this type of concrete are density, thermal conductivity, drying shrinkage are very low, This report presents the results of an investigation to calculate the performance characteristics of NO-fines concrete mixes with sufficient coir fiber in cement paste. No fine Concrete mix with different % of coir fiber was prepared to find an optimum mix yielding the highest compressive and split tensile strength. It was found that the strength of no-fines concrete is lower than that of normal weight concrete, but sufficient enough for secondary structural use. Due to presence of large number of voids, NO-fines concrete has large range of permeability properties which gives it many application for drainage purposes.

Keywords:- No fines concrete, Coir ,Compressive Strength ,Tensile Strength etc.

I. INTRODUCTION

No-Fines Concrete is a method of producing light concrete by removes the Fines from conventional plane concrete. This concrete is made up of only coarse aggregate, cement and water. Only single sized coarse aggregate, of size passing through 20 mm and retained on 10 mm is used. No-Fines concrete is a brittle material. The single sized aggregates make a good No-Fines concrete, which in addition to having large voids and hence light in weight, also offers architecturally attractive look. The coarse aggregate may be any of the usual type or the light weight aggregate. The coarse aggregate used should be finer than 20 mm size and percentage finer should not be more than 10% for best formation of No fine Concrete for 10 mm sieve. The usual proportion of cement to aggregate is 1:10 in case of heavy aggregate and 1:6 in case of light aggregate. The amount of water should be just

Sufficient to give a coating of cement paste on all particles. It is better to wet the aggregate before adding cement and water. The concrete should then be mixed thoroughly till all the particles are coated. It does not need any water tight forms also.

Sr. No	% of coir by Weight of Cement	Weight Of Coir	
		For cube(gm.)	For cylinder (gm.)
1	0.0%	-	-
2	0.5%	9.9	15.45
3	0.75%	15	23.175
4	1.0%	19.8	30.9
5	1.25%	25	40
6	1.5%	29.7	46.35
7	2.5%	49.5	77.25
8	3.5%	69.3	108.15

Table 1. Proportions of Mortar and W/C Ratio

II. DESIGN OF MIX PROPORTION

No-Fines concrete is generally made with the aggregate/cement ratio from 1:6 to 1:12 .The strength of No-fines concrete is dependent on the water cement ratio, aggregate cement ratio and unit weight of concrete.

The water cement ratio for such concrete will vary between a narrow range of 0.4 to 0.5. No-Fines concrete does not pose any serious problem for compaction hand compaction is just sufficient.

No-Fines concrete does not give much side thrust to the formwork as the particles are having point to point contact and concrete does not flow. Therefore, the side of the formworks can be removed in a time interval shorter than for conventional concrete. However, formwork may be required to be kept for a longer time, when used as a structural member, as the strength of concrete is comparatively less. The compressive strength of No-Fines concrete varies between 1.4 MPa to about 14 MPa.

Is code 12727: 1989 gives complete guideline for mix proportion design of No-fines concrete.

The proportions used for making of samples are as follows:

Cement	Aggregate	W/C Ratio
1	8	0.4

Table 2. Quantity of Coir Required By Percentage Weight

III. EXPERIMENTAL WORK

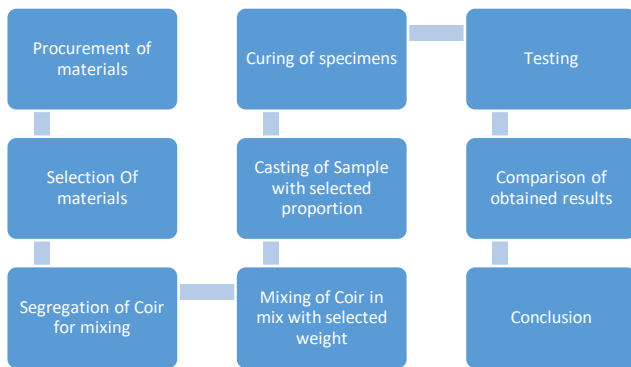


Fig 1:- Flow Diagram

An experimental program was decided which consist of casting and testing of specimen for the following test follow same as that of conventional way except curing method: -

- Compression test on cube sample.
- Split tensile test on cylinder sample.

Casting and curing: By mixing all specimen (cement, aggregate, and water and coir fiber) the No Fines concrete is filled in a concrete cube of size 150 X 150 X150 mm. The concrete cube was filled in three different layer first one third and two third and then three third tamping 20-25 times each level using a tamping rod of 60 cm long. The concrete was placed in a cube for after 24 hours, after that the cube was demoulded. Then this specimen is cured for next 24 hours in water. After further 24 hours, the same sample was removed from water and it properly rap or cover with polythene sheet so that the direct contact sample with air was avoided.



Fig 2:- NO-fines Concrete Cube



Fig 3:- Plastic Curing

IV. RESULT

Total 48 cubes were casted i.e.24 block and 24 cylinder of 1:8 proportion, with the addition of varying proportion of coir fiber by weight of cement.

Sr. No.	Fiber (%)	Stress (MPa)
1	0	4.13
2	0.5	7.41
3	0.75	6.55
4	1	4.79
5	1.25	4.36
6	1.5	4.14
7	2.5	3.92
8	3.5	2.17

Table 3. Compressive Strength

SR. NO.	FIBER (%)	STRESS (MPa)
1	0	0.34
2	0.5	0.37
3	0.75	0.41
4	1	0.44
5	1.25	0.42
6	1.5	0.41
7	2.5	0.37
8	3.5	0.36

Table 4. Split Tensile Strength

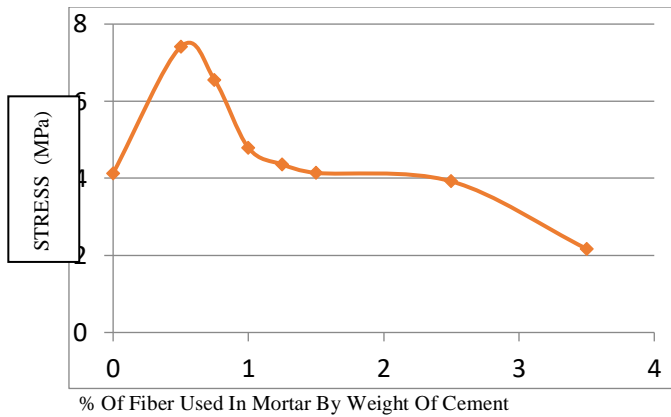


Fig 4:- Graph For Compression Strength

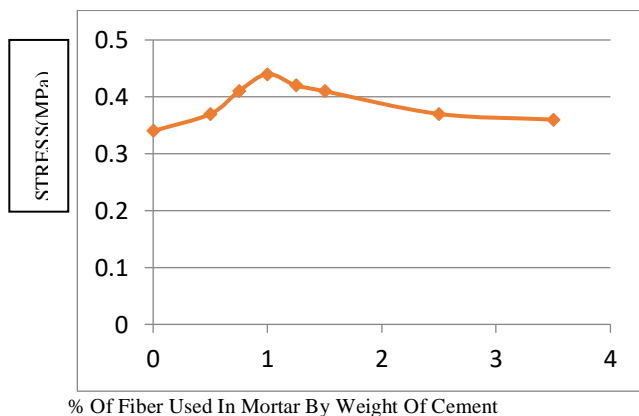


Fig 5:- Graph For Tensile Strength

V. CONCLUSION

From this research work, we could conclude the following:

- In plane concrete coir fiber reduce the strength like properties since in plane concrete strength based mainly on aggregate but in special case of No Fines concrete addition to its strength also based on binding material and hence when sufficient coir fiber is mix in binding material in case of No Fines concrete it impart an additional strength to it.
- 0.5 % of coir fiber used in mortar (binding material) by weight of cement it increases the No-fines concrete compressive strength by 79 % as compare to No-fines concrete compressive strength without coir fiber.
- 1.0 % of coir fiber used in mortar (binding material) by weight of cement it increases the No-fines concrete tensile strength by 29 % as compare to No- fines concrete tensile strength without coir fiber.
- As compare to No Fines concrete without coir fiber the No Fines concrete with coir fiber provided more erosion resistance since it holds the aggregate and coir in binding material itself acts as binder agent.
- For imparting strength of No Fines concrete, coir fiber must be adding in small percentage by Weight of

Cement as describe earlier hence it not mainly affect the drainage properties of No Fines concrete.

- If coir fiber introduces in No Fines concrete more than the ideal percentage (0.5% or 1.0% coir Fiber by Weight of Cement) it reduces the strength properties of No Fines concrete drastically even less than strength, we get by plane No Fines concrete without coir fiber.
- There are various applications of No Fines concrete present and hence only by ideally mixing coir fiber it may help to increase more fruitful operational functioning of that respective application.

REFERENCES

- [1]. Is code 12727: 1989. No Fines cast in situ concrete — code of practice.
- [2]. Is code 5816: 1999 Splitting tensile strength of concrete — method of test.
- [3]. M.Arunkumar V.kavimani - International journal on applications in civil and environmental engineering volume 2: issue 3: march 2016, ” experimental on properties of no-Fines concrete.”
- [4]. Mazharulhaq, — lightweight / low cost construction methods for developing countries.
- [5]. Abhijeet.R. Agrawal, Sanket S. Dhase, Kautuk S. Agrawal - international journal of engineering research and development,” coconut fiber in concrete to enhance its strength and making lightweight concrete.” Concrete technology by M.S. Shetty, vol 6.
- [6]. Asasutjarit, Hirunlabh, Khedari, Charoenvai, Zeghamati, Andshin,
- [7]. "Development of coconut coir-based lightweight cement board. “Construction and building materials.” ACI 522.1M-13.
- [8]. Specification for Pervious Concrete Pavement ASTM C1688M- 14a.
- [9]. Procedure for determining the density and void content of freshly mixed pervious concrete British Standard 476: 1932.
- [10].Specification for Fire Tests on Building Materials and Structures IS 2386.
- [11].Indian Standard - Methods of Test for Aggregates for Concrete IS 516.
- [12].Indian Standard - Methods of Tests For Strength Of Concrete.
- [13].ASTM C1372 Standard Specification for Segmental Retaining Wall.