Effect of Alccofine In High Strength Concrete

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Abstract- *The problem of reflection cracking through asphalt overlays can be approached from the design perspective of the factors or mechanisms involved the alternative treatments available, and the analyses and testing required evaluating the treatments. Then, a selection of the best alternative, provided it satisfies economic criteria, can be made and implemented. This paper concentrates on evaluation and first illustrates how an analytical method, based on a wide crack and theory of finite element formulation, can effectively be used for the first step of the process. Then, it illustrates how the most promising alternative treatments can be experimentally evaluated.*

Test procedures and example results are used for this purpose, and relation. hips between induced stress, or strain energy, and cycles to failure are presented. Selection, installation, and follow-up considerations are briefly discussed. It is pointed out that even with the most technically and economically feasible alternative, proper lay down and construction are important to realizing success. Follow-up monitoring would primarily involve periodic crack surveys. The major conclusions of the paper are that both analytical and experimental evaluations should be performed to screen potential crack reflection treatments, and that proper construction is essential after the best treatment has been selected.

There are two types of Alccofine: -

Alccofine 1203: - It is an alccofine with low calcium silicate. Alccofine 1200 series is of 1201, 1202, 1203 which represents fine, micro fine, ultrafine particle size respectively. Alccofine 1203 is a slag based SCM having ultra-fineness with optimized particle size distribution. Alccofine 1203 provides reduced water demand for a given workability, even up to 70% replacement level as per requirement of concrete performance

Alccofine 1101: - It is an Alccofine with high calcium silicate. It is a micro finer cementitious grouting material for soil stabilization and rock anchoring. The performance of Alccofine is superior to all other admixtures used in India. Due to high calcium oxide (Cao) content

I. INTRODUCTION

During the past few years, high strength concrete (HSC) has been generating increased interest amongst civil and structural engineers. The expanding commercial use of this relatively new construction material be explained partially by the life cycle cost-performance ratio it offers, as well as its outstanding engineering properties , such as higher compressive and tensile strengths, higher stiffness and better durability, when compared to the conventional normal strength concrete (NSC). Form a historical point of view, in the middle of 20th century concrete with characteristic strength, (f'c) of 25MPa was considered high strength. In the 1980s, 50MPa concrete was considered high strength. About two decades ago, hsc was mostly specified for projects as an alternate design. But today, has is being specified in the preliminary design stage as a sensible solution for the concrete construction.

Nowadays technology for producing has has sufficiently advanced such that concrete with compressive strength of up to about 120MPa are commercially available, and strength much higher than that can be produced in the laboratories. The significant economic advantages of HSC are very well- documented and evident from the no of recent construction projects where HSC has been used successfull

The use of HSC construction especially for multi-story buildings has become very common in industrialized and developing countries. In Australia, Where the majority of buildings are concrete structures, almost all concrete high-rise and medium rise building projects utilize HSC. Australia has taken the advantage of the benefits of high strength concrete. Through its widespread use on building such as Collins Street, MELBORNE CENTRAL, The rialto project in MELBURNE, The 43-storey high castled place project in Melbourne. In settle USA, The strength of concrete used on the pacific first Centre was about 125MPa the freedom Tower in new York city, which Wii be one of the world's tallest superstructure, is projected to be complete in 2010.The structure consist of robust high-strength concrete core paired with a highly reductant perimeter steel moment resisting frame. Most

experience on HSC in Europe has been gathered in now day, with that country's development in offshore platforms, bridges, and highway pavement. in Germany, SC was utilized in high rise building in Frankfurt, completed in 1992.HSC with a mean strength of 100MPa was used in the Petronas in Frankfurt, completed in1992.HSC with mean strength of 100MPa was used in the Petronas towers in Kuala lumpur in1998.THE Eureka Tower, which is one of the tallest building in Australia was completed in 2006 has utilized HSC up to 100MPa.

II. IDENTIFY,RESEARCH AND COLLECT IDEA

INTRODUCTION

Cement concrete has a large degree of physical and chemical complexity as it is complex material. The material reviewed useful for this research process has various resources. Some of the resources are closely associated with the present study. Some are sparsely related and others are remotely related and have been referred as the study gave the insight into the topic.

REVIEW OF LITERATURE

Concrete with high filling capacity was described by OZAWA (1990).

Defines that Concrete which have specified compressive strength of 6,000 psi or greater is known as high strength. High strength, high workability and high performance are the major characteristics of high performance concrete. HPC is a concrete in which certain characteristics are developed for particular application and environment. Durability is optional under the ACI definition and this has led to a number of HPC structures, which should theoretically have had very long services lives, exhibiting durability associated distress early in their lives.

ACI (AMERICAN CONCRETE INSTITUTE).

The objective of this study was to investigate that how chemical admixture such as super plasticizer and viscosity react with fresh concrete on the deformational and segregation. It also defines that without using any vibrator HPC can be filled into all corners. This study was done for developing the concrete with high filling capacity. It was found that their exists the suitable paste for improving not only the deformability but also the segregation resistance. The optimum mix 9 proportions of super plasticizer and viscosity agent was clarified for the concrete with high filling capacity.

In discussing the meaning of HPC, AICTIN AND NEVILLE (1993)

Defines that concrete which have high strength, high workability and high durability is known as high performance concrete. For the use of seafloor tunnels, offshore and coastal marine structures durability is the principal characteristics for high performance concrete mixture. For the high performance concrete the principal or the important characteristics which are required are strength, dimensional stability, impermeability and high workability. In this paper an overview of the composition of concrete and its effect on the properties desired for high performance is given. In this paper a new procedure for mix proportioning is described.

III. STUDIES AND FINDINGS

MEHTA AND AITCIN (1990)

Stated that "In practical application of this type of concrete the emphasis has in many cases gradually shifted from the compressive strength to other properties of the material, such as high modulus of elasticity, high density, low permeability and resistance to some forms of attack".

The FEDERAL HIGHWAY ADMINISTRATION (FHWA)

Defines that if the concrete is properly mixed, made with appropriate materials, transported, consolidated, placed and cured, the concrete which will be obtained will give excellent performance in the structure in which it is used.

HPC was defined by FORSTER (1994)

Four different criteria for different performance grades of HPC were proposed by FORSTER. And these criteria are further expressed in eight performance characteristics which are strength, durability, elasticity, freezing/thawing, chloride permeability, abrasion resistance, scaling resistance, shrinkage and creep. High performance concrete may require different grade of performance for each performance characteristics depending upon specific application

Siddharth P Upadhyay Prof. M.A. Jammu Studied "EFFECT ON COMPRESSIVE STRENGTH OF HIGH PERFORMANCE CONCRETE INCORPORATING ALCCOFINE AND FLY ASH".

In this study two different shapes of cubes were casted (cylindrical and cubical) and their strength was compared. The author partially replaced cement with ultra-fine

slag Alccofine. Compressive strength between cylindrical and cubical concrete was compared and from the comparison following conclusion were drawn: With Alccofine hardened properties of concrete are increased or are improved. There were very nominal changes after 10% replacement of Alccofine. Cylindrical strength of concrete increases after addition of Alccofine but always less than its cubical counterpart.

IV. GET PEER REVIEWED

Saurav, Ashok Kumar Gupta Studied "Experimental study of strength relationship of concrete cube and concrete cylinder using ultrafine slag Alccofine". In this study cement was replaced with Alccofine and fly ash and also manufactured sand was used in place of natural sand. The concrete specimens were cured under normal atmospheric temperature for 3, 7, 28 days and after curing strength characteristics were observed. The alccofine shows an early strength and fly ash shows long term strength. The maximum compressive strength was achieved by using 10% of Alccofine and fly ash 30%. The strength gained up to 3 days was good, between 3 to 7 days' strength gained was excellent and 7 to 28 days the strength gain was comparatively slow or less. Alccofine increases the filling ability, passing ability and resistance to segregation. If cost is compared, the cost of Alccofine is cheaper then cement hence it is also economic with higher strength.

AbhijitsinhParmar, Dhaval M Patel Studied "Experimental Study on High Performance Concrete by Using Alccofine and Fly Ash - Hard Concrete Properties". In this paper author said that now a day's demand of high performance concrete is increasing day by day. A concrete can be made high performance by using SCM's. In this research work author replaced cement with Alccofine, GGBS and fly ash. The test's which were taken into consideration were compressive strength test, chlorides attack tests, sea eater test and accelerated corrosion test at the age of 28 and 56 days.

The author Concluded that the results shows that concrete incorporating with alccofine and fly ash have higher strength and also alccofine has increased the durability of concrete have reduced the chloride diffusion. The compressive strength achieved by using Alccofine (8%) + fly ash (20%) is 54.89 Mpa at 28 days and 72.97 Mpa at 56 days.

Yatin H Patel, P.J. Patel, Prof. Jignesh M Patel, Dr. H S Patel Studied" Study on Durability of high performance Concrete with Alccofine and fly ash" In this study author used fly ash, volcanic ash, volcanic pumice, pulverized fuel ash, blast slag and silica fume as cement replacement material. The main of this study was to have ecofriendly and economical high strength concrete. After curing, compressive strength test was carried out at 7, 28, 56 days and results shows that the compressive strength test at 7 days is excellent, between 7 to 28 days the strength gained was comparatively less and between 28 to 56 days' strength gain is high because of fly ash in m3 proportion. And according to IS 456-2000 table 7 clause 6.2.1 fly ash in m3 proportion get acceptable strength. It is found that initial compressive strength achieved by using fly ash (22%) and Alccofine (8%) is 42.33 Mpa and 66.64 Mpa at 7 and 28 days respectively, but after 28 days' strength gain is comparatively less.

V.IMPROVMENT AS PER REVIEWED

M.S. Pawar, A.C. Saoji studied "Effect of Alccofine on Self Compacting Concrete".

In this study author concluded that the properties of SCC and fly ash are evaluated and compared with the properties of SCC with fly ash and alccofine. From the experimental investigations following conclusions were drawn.

Filling ability, passing ability and resistance to segregation are the selfcompatibility characteristic are increased by adding alccofine in SCC mixes.

The properties such as fresh properties and harden properties of SCCs are superior with 10% alccofine as compared to the 5% and 15% of alccofine.

Rajesh Kumar S, Amiya K Samanta, Dilip K. Singha Roy Studied "An experimental study on the mechanical properties of Alccofine based high grade concrete"

In this paper author concluded that alccofine increases Compressive as well as flexural strength to a large extent at 10% replacement. 7 days of compressive strength when compared and cement replaced by 10 % alccofine, strength is increased by 25.5% and when 28 days curing has been done it is found that the flexural strength is increased by 27.6%. it acts as a filler material if the percentage of alccofine is increased beyond that level and also it yields good workability to the concrete.

Ansari U.S, Chaudhri I.M, Ghuge N.P, Phatangre R.R. Studied "High Performance Concrete with Partial Replacement of Cement by Alccofine& Fly Ash".

In this study cement is partially replaced by Alccofine and fly ash for M70 grade of concrete. The

compressive strength of concrete of OPC concrete and with Alccofine and fly ash is compared and it has been found that the strength of concrete got increased by 20% with partial replacement of cement by Alccofine. The author concluded that the compressive strength of concrete increases with increase Alccofine and fly ash content in HPC up to 15 – 20%. High density of the mix was achieved and subsequently higher packing value. It is found that Alccofine is cheaper than cement. So for better strength and durability of concrete it should be promoted in Indian Construction Industry.

VI. CONCLUSIONS

This paper presents a review on effect of Alccofine on Properties of concrete. It was found that the addition of Alccofine shows an early strength gaining property long term strength. Alccofine concrete was found to increase the compressive strength of concrete on all age. From the experimental survey it was observed that the result of alccofine material increases the strength (both in compression and in flexure) to a large extent at approximately 10% replacement level of cement. It is seen that the 7 days' compressive strength when compared between control mix and cement replaced by 10 % alccofine an increase of 25.5 % is observed. If the percentage level of alccofine is increased beyond that level it acts as a filler material and yields good workability to the concrete. Since the materials are costlier than the cement, concrete cost will be higher but that can be adjusted during the execution/construction of structures. It is recommended to utilize the alccofine material with cement after checking its durability studies.

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REFERENCES

[1] Saurabh Gupta, Dr. Sanjay Sharma, Er. Devinder Sharma3 "A review alccofine a supplementary cementitious material, IJMMTER Vol. 3

[2] Saurav, Ashok Kumar Gupta, "Experimental study of strength relationship of concrete cube and concrete cylinder using ultrafine slag Alccofine" International Journal of Scientific & Engineering Research, Volume 5, Issue 5, May-2014 102 ISSN 2229-5518

[3] Siddharth P Upadhyay Prof. M.A. Jamnu "Effect on compressive strength of high performance concrete incorporating alccofine and fly ash" ISSN, Volume 2 Issue 2

[4] Yatin Patel, Dr. B.K. Shah, „Study on durability of high performance Concrete with alccofine and fly ash, (1998). IJSRD Vol.1 Issue (2013)

[5] Abhijitsinh Parmar, Dhaval M Patel, "Experimental Study on High Performance Concrete by Using Alccofine and Fly Ash – Hard Concrete Properties" International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 12, December. erties of alccofine based high grade concrete" International Journal of Multidisciplinary Research and Development

[6] Ansari U.S, Chaudhri I.M, Ghuge N.P, Phatangre R.R. "High Performance Concrete. With Partial Replacement of Cement by ALCCOFINE & Fly Ash