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A REVIEW OF THE STUDY ON THE BEHAVIOR OF CEMENT AND CONCRETE

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ABSTRACT

The mechanism of sulfate attack on portland cement concrete is not well understood. This has limited the ***confidence*** *that can be placed in the reliability of existing standard tests and models to predict performance and service life of concrete subjected to sulfate attack. A systematic research effort on sulfate attack is necessary to establish five criteriaMortar is used to hold building materials such as brick or stone together. It is composed of a thick mixture of water, sand, and cement. The water is used to hydrate the cement and hold the mix together. The water to cement ratio is higher in mortar than in concrete in order to form its bonding element.*

I.INTRODUCTION

The aim of Cement and Concrete Research is to publish the best research on cement, cement composites, concrete and other allied materials that incorporate cement. In doing so, the journal will present: the results of research on the properties and performance of cement and concrete; novel experimental techniques; the latest analytical and modelling methods; the examination and the diagnosis of real cement and concrete structures; and the potential for improved materials. The fields which the journal aims to cover are: Lime mortar does not harden under water, and for construction under water the Romans ground together lime and a volcanic ash or finely ground burnt clay tiles. Roman builders used volcanic tuff found near Pozzuoli village near mount Vesuvius in Italy. This Volcanic tuff or ash mostly siliceous in nature thus acquired the name pozzolana, having nearly the same composition as that of volcanic tuff or ash found at Pozzuoli. Some of the structures in which masonry was bonded by mortar, such as the Coliseum in Rome and the Pont du Gard near Nimes, have survived to this day, with the cementations material still hard and firm. In the ruins at Pompeii, the mortar is often less weathered than the rather soft stone.

II.LITURATURE OF CONCRETE TECHNOLOGY

Concrete :-Concrete is comprised of Portland cement, fine aggregate, coarse aggregate, water, pozzolans, and air. Portland cement got its name when it was first used in the early nineteenth century in England, because its product resembled building stone from the isle of Portland off the British coast. Portland cement is made by grinding a calcareous material, such as limestone or shell, with an argillaceous (clayish) material such as clay, shale or blast furnace slagLime mortar does not harden under water, and for construction under water the Romans ground together lime and a volcanic ash or finely ground burnt clay tiles. Roman builders used volcanic tuff found near Pozzuoli village near mount Vesuvius in Italy. This Volcanic tuff or ash mostly siliceous in

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A. Concrete materials : The development of chemical admixtures has revolutionized concrete technology in the last fifty years. The use of air entraining admixtures, accelerators, retarders, water reducers and corrosion inbitititors are commonly used for bridges.

B. Workability of Concrete : Workability of fresh concrete depends on its rheological properties. This rheological behavior is defined by two characteristics of the concrete, i.e. yield stress and plastic viscosity

C. Concrete mixture proportioning : Higher strength concrete for bridges is commonly used for columns and beams. Higher strength concrete usually provides higher abrasion resistance and where appropriate this is considered in the bridge deck and pavement designs.

III.MATERIAL USED

A. CEMENT and WATER: - Ordinary Portland cement of grade 43 is used to prepare the mix design of M-30 grade. The cement used was fresh and without any lumps Water – cement ratio is 0.43 for this mix design using IS 456:2007. TABLE I- PROPERTIES OF CEMENT: - Properties Observed values Specific gravity 3.15 Fineness 3 % Initial setting time 45 min Final setting time 195 min Soundness By Le Chatelier method 6 By autoclave test method 0.5 Compressive strength 3 days .

B. FINE AGGREGATE: - Aggregate of maximum Size 4.75 mm are used as a fine aggregate the Experimental program was locally procured And conformed to grading zone 3 as per IS: 383-1970.

C. COARSE AGGREGATE: - The coarse aggregates are locally available was used having maximum size of 20 mm

D. SAND: - Clean river sand clean river sand of maximum Size 4.75 mm are used as a fine aggregate .the Experimental program was locally procured And conformed to grading zone 3 as per IS: 383-1970.

E. MOULDS: - Here we used three types of moulds to check strength at various proportions of replacement.

Cubical: - cubical mould of size 150*150*150 mm was used to prepare the concrete specimens for determination of compressive strength of concrete.

Cylindrical: - cylindrical mould of size 300 mm Height and 150 mm Diameter was used to prepare the Concrete specimens for determination of Splitting Tensile Strength of concrete

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F. SILICA FUME: - Very fine non-crystalline silica produced in electric arc furnaces as a byproduct of the production of elemental silicon or alloys containing silicon; also known as condensed silica fume or micro silica.

G. FLY ASH: - Fly ash is the ash removed from the exhaust gas of burning coal at power plants to generate electricity. The ash is removed from the exhaust by air pollution control equipment such as electrostatic precipitators before the exhaust is emitted through stacks or chimneys into the atmosphere.

H. SUPER-PLASTICIZER:- 1% super-plasticizer was used in all the test specimens for high performance (i.e., high workability at lower water-binder ratio) and to identify the sharp effects of Silica Fume and Fly Ash on the properties of concrete

IV.LATEST TECHNOLOGY AND APPLICATIONSOF CONCRETE TECHNOLOGIES

The use of recycled materials generated from transportation, industrial, municipal and mining processes in transportation facilities is a issue of great importance. Recycled concrete aggregates and slag aggregates are being used where appropriate.

V.APPLICATIONS

1.HIGH-PERFORMANCE CONCRETE(HPC) The term “HPC” was first introduced by NIST,FHWA, COE and ACI in early 1990s. Concrete meeting special performance requirements that cannot always beachieved routinely using conventional constituents and normal mixing, placing, and curing practices. Many conferences and publications since 1990s were conducted for HPC. Performance Requirements for HPC : Placement•& Compaction w/o Segregation Early-Age Strength• Enhanced Mechanical Properties• Volume Stability• Enhanced Durability•& Service Life: o Low Permeability o Abrasion Resistance o Fire Resistance General Characteristics of HPC :

General Characteristics of HPC

High Strength

Good Workability

Good Durability

Benefits of HPC : The direct advantage of HPC construction schedule is the early stripping of formwork. In addition, the greater stiffness and higher axial strength allows for the use of smaller columns in the construction. This will improve the construction schedule by reducing the amount of concrete that must be placed. These factors combined lead to construction elements of high economic efficiency, high utility, and long-term engineering economy - Reduction of structural steel allows for greater flexibility in designing the shape and form of structural members - Superior ductility and energy absorption provides structural reliability under

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earthquakes - Reduction of structural steel allows numerous structural member shape and form freedom - Superior corrosion resistance

•Processing: Cement manufacture, mixing and rheology, admixtures and hydration. While the majority of articles will be concerned with Portland cements, we encourage articles on other cement systems, such as calcium aluminate. •Structural and Microstructural Characterisation of the unhydrated components and of hydrated systems including: the chemistry, crystal structure, pore structure of cement and concrete, characterisation techniques, and structural and microstructural modelling. •The properties of cement and concrete, including: fundamental physical properties; transport, mechanical and other properties, the processes of degradation of cement and concrete; and the modelling of properties, both as a means of predicting short and long performance, and as a means of relating a material's structure to its properties. •Applications for cement and concrete, including: concrete technology, fibre reinforcement, waste management, and novel concretes.

.**Self-Compacting Concrete(SCC) ;** SCC provides improvements in strength, density, durability, volume stability, bond, and abrasion resistance. SCC is especially useful in confined zones where vibrating compaction is difficult. The reduction in schedule is limited since a large portion of the schedule is still controlled by the time required to erect and remove formwork. Although the schedule reduction is limited, it is still sufficient that the reduction in labor costs overcomes the higher material costs.

VI.CONCLUSION

Significant advances have been made in concrete technology during the last fifty years. This paper has highlighted some of the significant advancements in technologies and their effect on the design and preservation of infrastructure. While it is not the definitive state-of-practice for design and preservation, it does bring to the forefront some of the technologies that are being considered by professionals. Some of the successful examples are discussed in this paper. Many of the innovations have been incorporated in the routine practice.

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