Implementation of Petrography of Lightweight Aggregates

S.V.V.Prasad[1]
Assistant professor and H.O.D, K.O.R.M.C.E., KADAPA Andhra Pradesh

Abstract: *The main objective of this research is to produce structural light weight concrete using natural aggregate and optimization of strength properties. Actually aim is to Produce such a light weight which in addition to its light weight advantages poses construction possibilities as structural concrete in slabs, beams, and columns. Based on researches done in providence with a rich reservoirs of mineral aggregate mine with desired strength properties and this kind of aggregate was used in above mentioned concrete mixes. In current research various samples of this mine have been investigated as light weight aggregate in light weight structural concrete mixes. In addition to above not only it was important to produced concrete but also it was essentially necessary for researchers that produced mix designs to be practical in concrete practices and has economic benefits. Tests done on the aggregate in this research include followings: Identifying the aggregate from geological point of view measurement of water absorption in varieties of time-Density in air dried and saturated dry surface states(SSD)-defining aggregate water content from dried in air state to oven dried state and aggregate compressive strength. Tests done on concrete samples: Measurement of compressive strength-tensile strength-slump test.*

Keywords:*-Light Weight Structural Concrete-Pumice-Natural aggregate-Compressive strength*

I. INTRODUCTION

One of the real issues in configuration and execution of structures is the significant weight of dead load, which basically comes about because of the weights of roofs and divider dividers. Utilizing lightweight normal and simulated materials is of enthusiasm as a viable arrangement to lessen the measurements of the supporting structure, minimize the quake compel on the building lastly to build the rate, encourage the execution and streamline the task. To abatement the measure of misfortunes and harms coming about because of tremor other than watching the right standards and criteria of planning, it is important to outline and execute the structures with conceivable least weight. In such manner, it is important to complete uncommon studies in the field of utilizing suitable lightweight materials, which permit the execution of structures with lower weights. Various types of lightweight cements can be arranged in three general gatherings including non-fine concrete, cell concrete and lightweight total solid agreeing their generation systems. Lightweight cements can be characterized in three gatherings including auxiliary lightweight cement, semi-auxiliary lightweight cement and non-basic lightweight solid as per their application purposes.
In this paper, this sort of cement is being investigated as far as basic uses and similarity with code necessities on the premise of results got from creation of lightweight solid utilizing pumice of the region.

II. PROPOSED RESEARCH

Construction Methodology

Lab system to focus physical and mechanical properties of created lightweight cements is as per the following:

- Producing lightweight solid utilizing pumice lightweight totals (fine totals & coarse totals pumice)
- Producing solid examples utilizing three proportions of water and concrete (W/C= 0.35, 0.4, 0.48)
- Determining the properties incorporating thickness of solid in diverse states, compressive &Elasticity on 3rd, 7th what's more, 28th days.
- Using silica smolder to increment compressive quality of lightweight solid in the event that that the code prerequisites identified with compressive quality of auxiliary lightweight cements are most certainly not satisfied.

- Offering the ideal blend outline

A Empirical Study of Petrography of Lightweight Aggregates

Investigation of petrography of lightweight totals demonstrates that the surface of devouring totals (about %75) is basically of lustrous composition and their quartz amount is not exactly %10, feldspathic record is beneath %40 and its change is not exactly %25.Its changed minerals incorporate zeolite and ferromaganezine. This stone is named normalstones regarding acridity and alkalinity on the premise of its substance of Sio. In light of their minerals, glass amount, crystallization way and substance examination thesetotals were resolved as pumice

Compositions	Percentages of Oxides	
	Coarse of Aggregate	Fine of Aggregates
Sio_2	62.77	58.98
Al_2o_3	17.12	17.13
Fe_2o_3	4.88	4.88
CaO	4.90	1.35
MgO	1.11	1.11
L.O.I	1.88	3.97
Na_2O	3.32	3.12
K_2O	1.36	1.44

Table 1: Chemical Analysis of Pumice of .the Region.

Grading of Lightweight Aggregates

Coarse materials were chosen principally from lightweight totals with greatest size of 1.2 inches (12.5 mm) and lightweight fine totals and materials went from sifter no.4 (around 5 mm).Generation of thick cement has been arranged in this study and creation of lightweight cement with spaces between totals utilized as a part of creation of solid pieces are not considered in this program.

Evaluating of blended lightweight totals was chosen as fine totals with the extent of 0-4.75 mm and coarse totals with the extent of 4.75-12.5 mm to be put in allowed point of confinement of decided reviewing as per ASTM C330 standard.

Quantities of components of mixed lightweight concrete

Proportions of blends of segments were resolved by 211.2-91.To gauge the measures of lightweight totals irrefutably the volume strategy was utilized which is more exact than weight technique in materials. Volume of Aggregates = 1- (volume of bond + volume of water + rough volume of entangled air) Weight of totals = volume of totals ×γsat furthermore, γsat = Aggregate thickness of lightweight materials immersion Considering high measure of water retention in lightweight totals in contrast and standard totals, it is hard to focus humiditystate of lightweight totals and appraisal the measure of water assimilation amid blending lastly deciding free water in blending undertaking. Amid creation of solid blends the lightweight totals are filtered for 24 hours to achieve immersion stage and after that utilized as a part of generation of blends with immersed surface dry (SDD). The measures of parts of delivered lightweight soluble

Tests carried out on Concrete Samples.

Tests of compressive quality were done on cubic specimens (15×15×15 cm). Round and hollow specimens with measurements of (15×30) cm were utilized for rigidity (Brazilian Test). The sums acquired for compressive qualities are normal quality of elements of standard round and hollow examples of (15×30) cm acquired by changing over the quality of cubic specimens utilizing proposed code coefficient.

Test Results

As indicated by Iranian solid code, the 28-day compressive quality of lightweight cement (standard barrel shaped examples) ought to be more than 160 kg/ cm². The ASTM C330 standard restricts the least compressive quality up to 170 kg/cm² and the particular weight up to 1850 kg/m³ The consequences of led tests demonstrate that the compressive qualities of cements delivered with lightweight totals (fine total & coarse total pumice) are not exactly the code compressive qualities. For this situation, the delivered cements can't be utilized as basic lightweight cement So to acquire the 28-day compressive quality of lightweight solid at the measure of 270 to 300 kg/cm² to use in basic applications, the accompanying moves were made: With a specific end goal to decline the thickness of concrete, distinctive specimens of pumice total with diverse grain sizes, diverse water-concrete proportions and alsodifferent weights of bond and silica smoke were arranged. The acquired results demonstrated that if the sizes of pumice totals are bigger the compressive quality of solid specimens will be low due to low quality of totals and in instance of utilizing fine total pumiced, the compressive quality of tests will be expanded yet the thickness of solid will be closer to thickness of customary cements, so we cannotsay that this cement is a lightweight cement. To tackle this issue, lightweight materials of mineral clinker are utilized and a lightweight cement was delivered utilizing clinker materials. The proportion of water-bond is expanded in these cements in view of high measure of water in clinker and it is unrealistic to pick water-bond proportion lower than 0.4 in light of low productivity of cement. So as to tackle this issue, the water-concrete apportion ought to be expanded in these cement.

By expanding the proportion of water-concrete, the acquired quality will be low in these specimens and it won't be conceivable to utilize them as auxiliary cements. In this manner, in the following step, we will attempt to produce solid examples with measurements of (15×15×15) cm, diverse weights of coarse total furthermore, fine total pumice, crease with diverse ratiosof water-bond, distinctive weights of concrete furthermore, silica rage together with superplasticizer. As creases are utilized as a part of these examples, the thickness of solid reductions and the weights of the tests diminishes in light of the presence of pumice totals, while the compressive quality of the solid increments. Utilizing pumice as part of solid blend tackled the crawling issue of solid specimens delivered with crease.Among various types of created solid blends, the blend that acquired 28-day compressive quality in 270 to 300 kg/cm² and has the least thickness was chosen for proceeding with the examination.

Cement Kg/m^3		420
Silica Fume Kg/m^3		50.4
Pumice Aggregate	Coarse Kg/m^3	300
	Fine Kg/m^3	800
Crinkle Aggregate Kg/m^3		350
Water Lit/m^3		189
Superplasticizer Lit/m^3		12.6
W/C		0.45
W/(C+F)		0.37

Table 6: Weights of Consuming Materials in Optimum Mix Design.

Curing the Samples

In the wake of selecting the ideal blend plan, the solid examples were arranged by 6 with measurements of (15×15×15) cm. Following 24 hours, the specimens were taken out of molds and were put in immersing environment and afterward the test of compressive quality was completed for 3-day, 7-day and 28-day cement.

III. CONCLUSION

The studies demonstrated that the expending totals are chiefly of pumice. By utilizing pumice with 12 % silica rage rather than bond it is conceivable to acquire the compressive quality near to basic quality. Studying the consequences of tests led on tests containing lightweight coarse totals and lightweight fine totals with bond at the measure of more than 400 kg/m³ demonstrated that came about compressive quality for this situation is between 125-152 kg/cm² while the thickness of dried examples were variable between 1365-1530 kg/m³. Thus, there cements don't satisfy the code prerequisites of basic cements.Density of lightweight cement delivered with pumice totals, crease and 12 % Silica Fume rather than bond is around 1762, while the came about compressive quality is between 270-300 kg/cm². The code prerequisites are satisfied for this situation (ASTM C330) andthe delivered examples will be suitable to be utilized for auxiliary applications.Lightweight auxiliary solid will be around 25 % lighter than conventional cements. By utilizing lightweight basic cement with pumice, the dead load and subsequently the weight of the building will be impressively diminished. So it is conceivable to minimize the costs of embellishment and transportation of cement and support. Likewise when these cements are utilized to build the roofs and light emissions structures, measurements of sections (exceptionally) in lower stories will be impressively diminishing.

IV. REFERENCES

[1] JosefhJ.waddell,JosephA.dobrowolski,Concrete construction handbook,Third edition,2001

[2] concretology, translated by HormozFamili,university of science and tecknology,1996

[3] Famili, Hormoz,Research project of lightweight aggregate concrete, university of science and technology.2000

[4]ACI 211.2 (1998).Standard practice for selecting proportions for structural lightweight concrete. American Concrete Institute, Detroit, USA.

[5]ACI 213 (1970). Guide for structural lightweight aggregate concrete. American Concrete Institute, Committee 213 Report, Paris, France.Al-Negheimish AI, Al-Zaid RZ (2004). Effect of manufacturing process and rusting on the bond behaviour of deformed bars in concrete. Cem.Concr. Comp., 26:735–742.

[6]ASTM C 192 (2003). Practice for making and curing concrete test specimens in the laboratory. Annual Book of ASTM Standards.West Conshohocken, PA, USA.

[7]ASTM C 234-91 (2000). Standard test method for comparing concretes on the basis of the bond developed with reinforcingsteel. Annual Book of ASTM Standards, West Conshohocken, PA, USA.

[8]ASTM C 330 (2003).Standard specification for lightweight aggregates for structural concrete.Annual Book of ASTM Standards, West Conshohocken, PA, USA.

[9]ASTM C 494 (1994).Standard specification for chemical admixtures for concrete.Annual Book of ASTM Standards, ASTM, WestConshohocken, PA, USA.

[10]ASTM C 138 (2001). Standard test method for density(unit weight), yield, and air content (gravimetric) of concrete. Annual Book of ASTM Standards, ASTM, West Conshohocken, PA, USA.

AUTHOR PROFILE

S.V.V.PRASAD is currently working as Head of Department of civil engineering in K.O.R.M.C.E., Kadapa. He has the total teaching experience of 5Years.He completed his UG in Civil Engineering in K.S.R.M. College Of Engineering And He received Post Graduate in Highway Engineering in Sri Datta Institute of Engineering College,R.R.DIST. His area of Interest is Civil Engineering and Highway Engineering.