An Experimental Study on Partial Replacement of Fine Aggregate with Stone Dust in Production of Interlocking Paver Block

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Abstract- ***The rapid development of housing and infrastructure from last one decade continuously takes place in India. Along with that naturally, the product required to overcome this development produce in mass quantities like Pavement blocks, which are known as industrial products of precast made up by concrete, having various shapes and sizes utilizes in huge quantity in housing and infrastructure construction. The conventional materials to manufacturing these blocks utilize in large quantity, which may create an impact on natural recourses. Paver blocks unit generally used for diverse traffic classes i.e. Non-traffic, Light-traffic, Medium-traffic, Heavy-traffic and really important traffic. Most concrete block paving created in country has performed satisfactorily but there are two main areas of concern: occasional failure thanks to excessive surface wear, and variability inside the strength of blocks. To overcome this impact we can use different materials such as, Sisal fiber, waste glass, fly ash, Stone dust etc. which helps to save natural recourses and achieve economy so that buyers and sellers of this type of materials can also get benefited. Concrete paving blocks are ideal materials on the footpaths for easy laying, better look and finish. In this thesis, a parametric experimental study for producing paving blocks using crusher dust is presented. Some of the physical and mechanical properties of paving blocks with fine aggregate (sand) replaced by various percentages of crusher dust are investigated.***

INTRODUCTION

Rural Road property may be a key element of rural development, since it promotes access to economic and social services, thereby generating magnified agricultural productivity, non-agriculture employment likewise as non-agricultural productivity, that successively expands rural growth opportunities and real financial gain through that financial conditions are often reduced. A study disbursed by the International Food Policy analysis Institute on linkages between government expenditure associated financial condition in rural Asian country has unconcealed that an investment of Rs one large integer in roads lifts 1650 poor persons on top of the personal income. Public investment on roads impacts rural financial condition through its impact on improved agricultural productivity, higher non-farm employment opportunities and magnified rural wages. Improvement in agricultural productivity not solely reduces rural financial condition directly by increasing financial gain of poor households, it additionally causes decline in financial condition indirectly by raising agricultural wages and lowering food costs (since poor households square measure web consumers of food grains). Similarly, magnified non-farm employment and better rural wages additionally enhance incomes of the agricultural poor and consequently, scale back rural financial condition.

OBJECTIVES

The objectives of the research are outlined below:

- The objective of the research is to study the effect of the use of Stone dust as a replacement of fine aggregate for Paver Blocks.

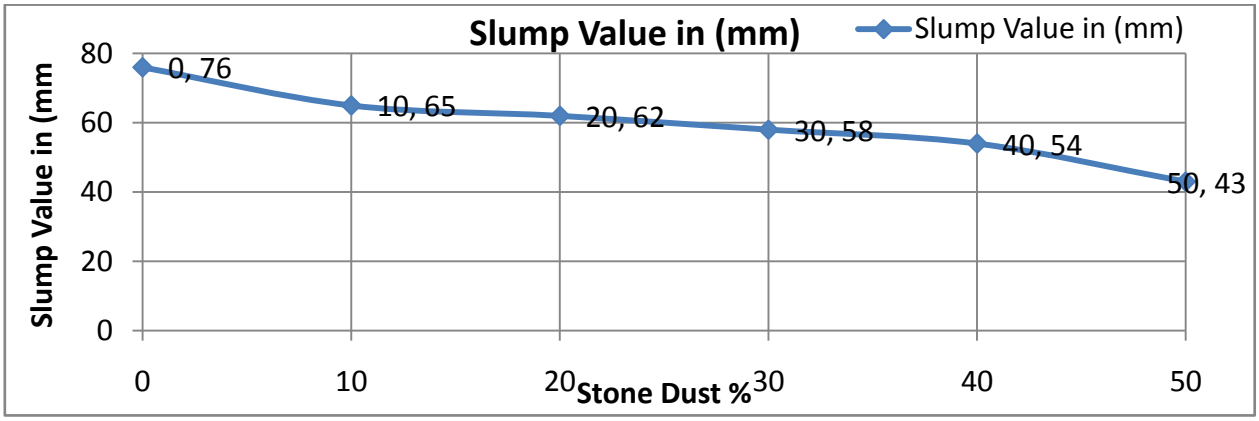

Figure 5.2: Workability of Stone Dust mixed in concrete (Line Figure)

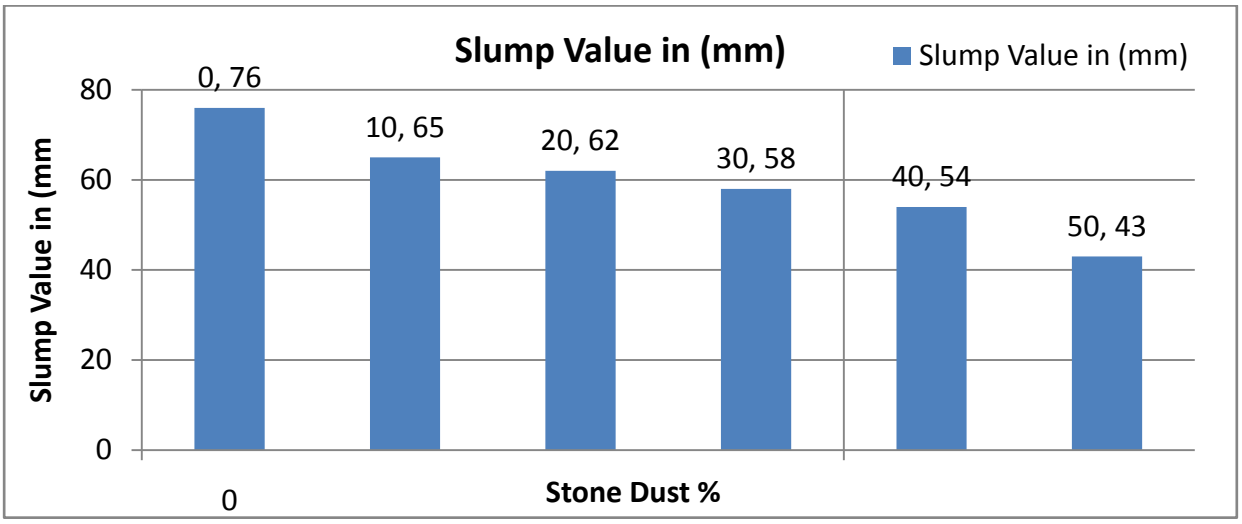

Figure 5.3: Workability of Stone Dust mixed in concrete (Bar Chart)

Table 5.1: Workability of Stone Dust mixed in Concrete

Mix Name	Slump (mm)
CC	76
SD10	65
SD20	62
SD30	58
SD40	54
SD50	43

COMPRESSIVE STRENGTH

Result of compressive strength of paver blocks is given in table 5.3 and Figure 5.5 shows compressive strength of Stone Dust paver blocks shows corrected compressive strength of paver blocks, results shows that compressive strength Stone Dust paver blocks increases when Stone Dust is added in paver blocks composition and gives optimum value of 40%.

Table 5.2: Corrected compressive strength of Stone Dust paver blocks

Stone Dust	Compressive Strength in N/mm2		
%	7 Days	14 Days	28 Days
0	20.02	26.62	32.52
10	24.74	27.42	34.36
20	25.96	28.9	35.8
30	26.32	29.21	35.26
40	28.8	30.6	36.96

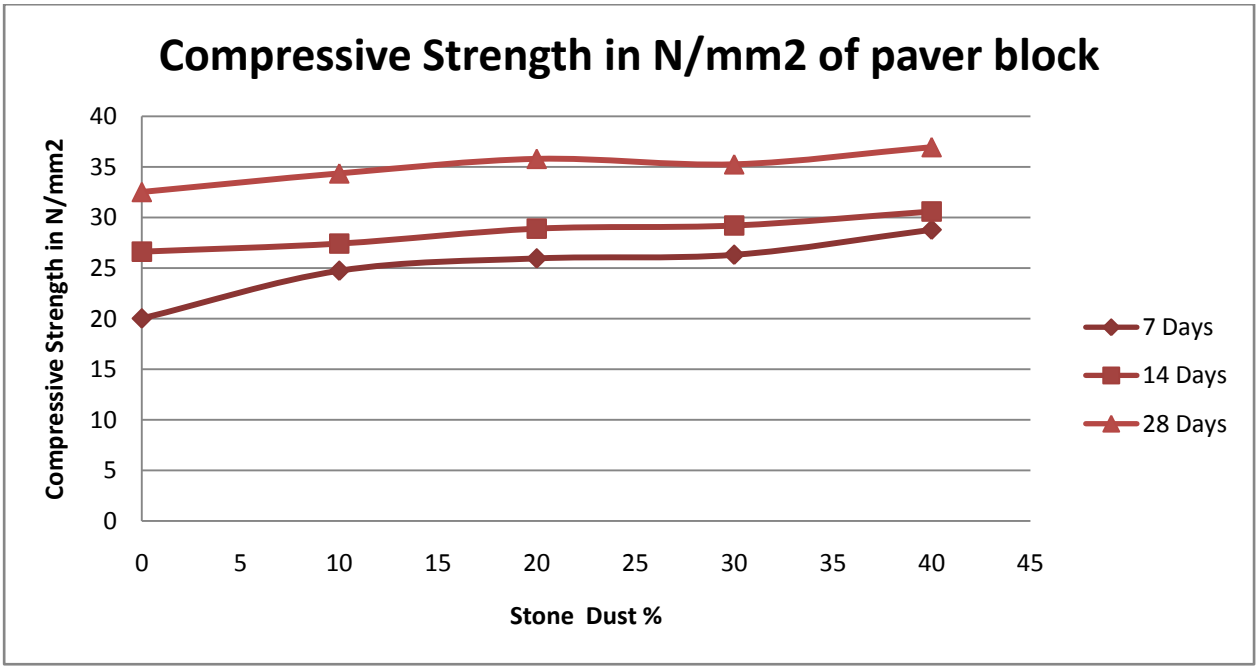

Figure 5.5: Corrected compressive strength of Stone Dust paver blocks

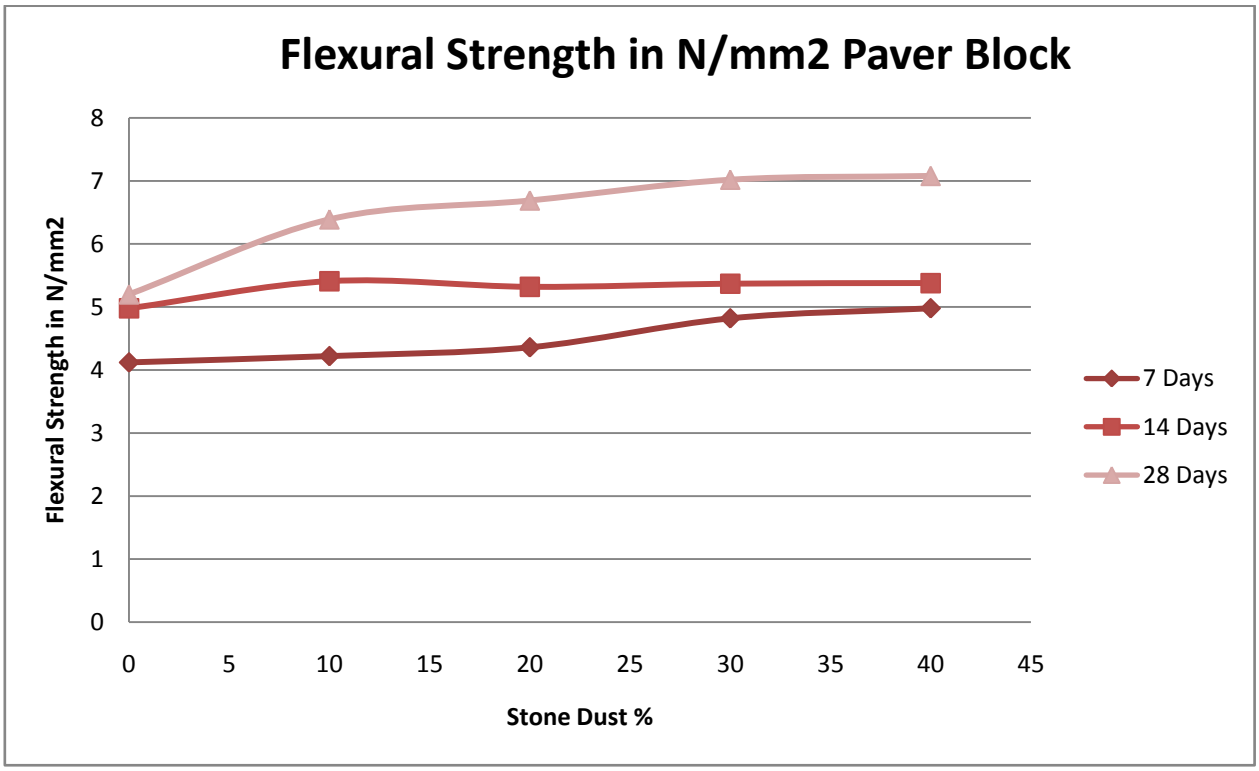

Figure 5.8: Result of flexural strength of Stone Dust paver blocks

Figure 5.4 Compressive Strength Test

5.4 Flexural Strength

Result of flexural strength of Stone Dust paver block is given below in table 5.4 and Figure 5.8 it has been observed that like compressive strength, flexural strength of the blocks increases when Stone Dust is added in paver blocks composition and gives optimum value of 40%. Concrete mix gives flexural strength of 5.2 N/mm^2, when 40% Stone Dust is added by the weight of the sand, it attains maximum compressive i.e 7.08 N/mm^2, gives optimum value of Stone Dust 40%

Where, the flexural strength of the specimen shall be calculated as $F_b = \frac{3Pl}{2bd\ ^2}$

Where, F_b = flexural strength, in N/mm^2; P = maximum load, in N; l = distance between central lines of supporting rollers, in mm; b = average width of block, measured from both Faces of the specimen, in mm; and d = average thickness, measured from both ends of the fracture line, in mm. The maximum load **P** shall be reported as-the breaking load, nearest to 1 N.

Table 5.3: Result of flexural Strength of Stone Dust paver blocks

Stone Dust %	Flexure Strength in N/mm2		
	7 Days	14 Days	28 Days
0	4.12	4.98	5.2
10	4.22	5.41	6.39
20	4.36	5.32	6.69
30	4.82	5.37	7.02
40	4.98	5.38	7.08

CONCLUSION

- Workability is the ease of work of concrete, for this study workability of concrete is checked by slump cone test, it has been observed that introduction of Stone Dust in concrete decreases the workability of concrete.
- As the percentage of Stone Dust is increases in concrete, workability of concrete is decreased, control

concrete mix (CC) possess 76 mm slump whereas goes down to 43 mm when sand is completely replaced by Stone Dust .

- Compressive strength of Stone Dust paver blocks increases when Stone Dust is replaced by sand in the composition of paver blocks.

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