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HYPO SLUDGE PAVER BLOCKS

Mithun[1], Chethan Kumar N T[2]

[1]*Assistant Professor, Civil Engineering Department, PACE, Mangaluru, Karnataka (INDIA)*

[2]*Assistant Professor, Civil Engineering Department, SCEM, Mangaluru, Karnataka (INDIA)*

ABSTRACT

More than 300 million tonnes of industrial waste are produced per annum in India mainly by chemical and industrial waste. Hypo sludge is a type of waste obtained by paper production industries. Disposal of this waste become huge difficult.

In this project an experimental investigation carried out on hypo sludge as a replacement for cement in terms of percentage and also replacement for fine aggregate in the casting of paver blocks for M30 grade, which suits for medium traffic as per IS standards.

Key Words: Compressive strength, Hypo sludge, Paver block

I. INTRODUCTION

Interlocking Concrete Block Pavement (ICBP) has been extensively used in many countries for quite some time as a specialized problem-solving technique for providing pavement in areas where conventional types of construction are less durable due to many operational and environmental constraints. These are the solid, unreinforced pre-cast cement concrete paver blocks and are complementary products which are used for light, medium, heavy and very heavy traffic paving applications and other applications. ICBP technology has been introduced in India in construction, a decade ago, for specific requirement namely footpaths, parking areas etc. But now being adopted extensively in different uses where the conventional construction of pavement using bituminous mix or cement concrete technology is not feasible or desirable.

Currently the Indian Institute of Technology (IIT), Kharagpur, has joined in the research and development efforts. Application of CBP/lCBP Technique is finding increasing popularity around the country, especially in metropolitan cities as well as in large and medium towns. Currently a number of entrepreneurs are engaged in this business. Considering the increasing scope for application of this specialized paving technique, BIS recognizes the need to regulate the quality of paver blocks and CBP/ICBP So that the purchaser is ensured of uniformly good quality of blocks and CBP/IC13P.

1.2 Effects of hypo sludge on the properties of fresh concrete

- Improve the workability up to certain limit.
- Presence of Cao after some limits increases water demand.
- Less segregation and bleeding.

- High heat of hydration.
- Easier finish

1.3 The main objectives and scope of study:

- To determine the different strength parameters of the hypo sludge added paver block with the replacement of cement and also with fine aggregate (sand).
- To compare result with NCC paver blocks.
- To recommend its provision in the code.
- To set parameters for future investigations.
- To solve the problem of disposal of hypo sludge by utilizing it in the construction of paver blocks.
- To reduce the effects caused by the disposal of hypo sludge.

1.4 Present work

In the present work M30 grade of concrete is considered for Non-traffic category as per Table 1 of IS 15658:2006 for the experimental investigation. Cement partially replaced with different percentage of hypo sludge namely 10%, 20%, 30%, 40%, 50% and 60%. Hypo sludge is also fully replaced with fine aggregate (sand) in other trial. Comparative result of workability and compressive strength of conventional concrete paver block and hypo sludge added concrete paver block are reported.

II.STUDY METHODOLOGY AND TESTING

2.1 Experimental procedure

Strength behaviour of hypo sludge paver block (HSPB)

2.1.1 Fresh concrete:

To get the appropriate mixed design and to study the workability and behavior of M30 grade HSPB fresh concrete.

2.1.2 Hardened concrete:

To study the compressive strength behavior of M30 grade HPS concrete paver blocks mould specimen are prepared and 3 blocks are tested for 7, 14 and 28 days compressive strength of HPS paver blocks is compared with normal concrete paver blocks.

2.1.3 Materials used:

In this work ordinary Portland cement of 43grade conforming to IS 8112-1989.the physical and chemical properties of cement obtained on conducting appropriate test and the requirements as per 4031-1968.

In our present study river sand is used as fine aggregate comes under zone III as per IS code. The physical properties of fine aggregate also tested asper IS standards.

Coarse aggregate crushed granite of 10mm down size has been used as coarse aggregate. The physical properties of coarse aggregate like specific gravity are tested in accordance with IS: 383-1970.

Paver blocks are casted using rubber moulds. As we are using rubber moulds we cannot do hand compacting using tamping rods. So, compaction should be done by using vibrating machine.

Plate 1:Hypo sludge

Plate 2: Casted Hypo sludge paver block

III.RESULTS AND DISCUSSIONS:

3.1 General: The test results on setting time, workability and compressive strength of different replacement levels of hypo sludge are compared with normal concrete.

(Table 3.1) Setting time

SL.NO	INGREDIENTS	INITIAL (MIN)
1	Cement +0% hypo sludge	30
2	Cement +10% hypo sludge	33
3	Cement +20% hypo sludge	35
4	Cement +30% hypo sludge	37
5	Cement +40% hypo sludge	39
6	Cement +50% hypo sludge	40
7	Cement +60% hypo sludge	42

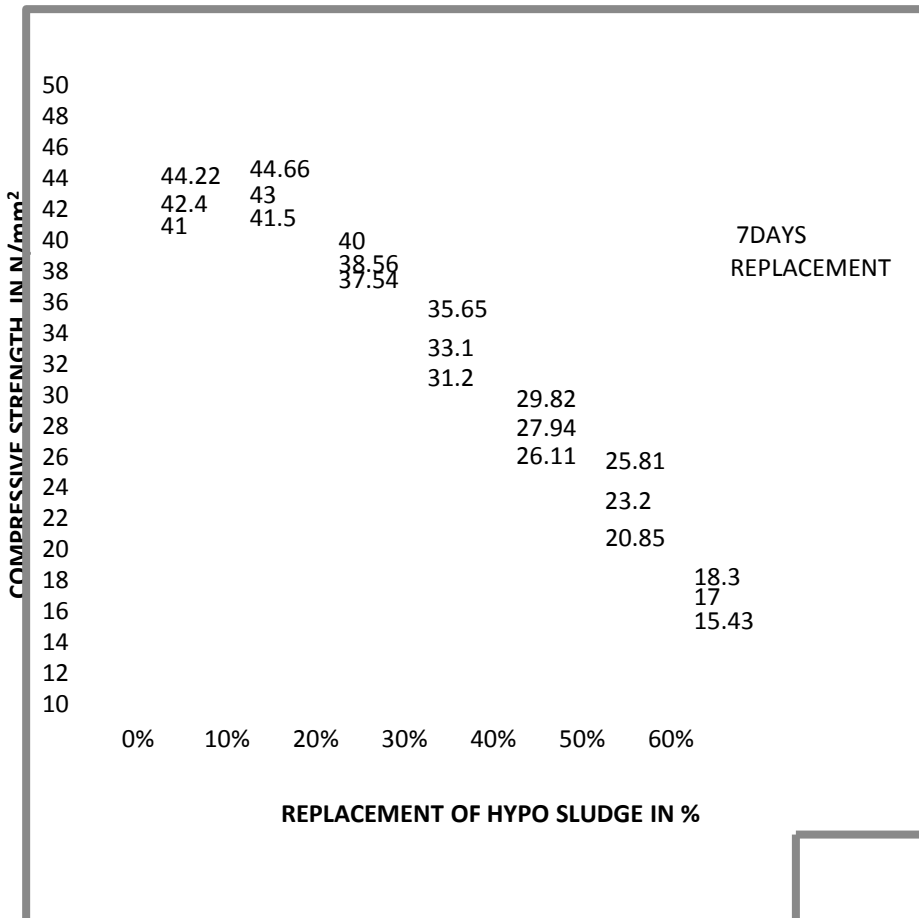

Fig: 3.1 compression strength of hyposludge paver block for different perecentage for 7,14 and 28 days

Table 3.2

Compressive strength of normal conventional paver block vs different percentage of hypo sludge(cement)

DAYS	NCPB	10%HSPB	20%HSPB	30%HSPB	40%HSPB	50%HSPB	60%HSPB
7	107%	107%	98%	81%	68.26%	54%	40%
14	110%	110%	100%	86%	73%	60%	44%
28	115%	115%	104%	93%	78%	67%	48%

IV.CONCLUSSION AND SCOPE FOR FUTURE STUDIES:

Finally we conclude our project with full satisfaction of completing the project by Casting of conventional cement concrete paver blocks has been done. Casting of concrete paver block with replacement of industrial waste (hypo sludge) has also been done. Comparison of results has been done. Testing of concrete paver block with various percentage replacement compressive strength test is done for paver blocks of replacement 0%, 10%, 20%, 30%, 40%, 50% and 60% of hypo sludge concrete paver block. Compressive strength test is also done by replacing hypo sludge by 100% (fully) with fine aggregate. The compressive strength has been

increased for 10% replacement of hypo sludge. So up to 10% cement can be replaced by hypo sludge. We can also fully replace the hypo sludge with sand, as 100% compressive strength is gained in 7 days.

4.1 Scope for future studies:

- Characterization study on hypo sludge by collecting the samples from different source. Hence the sample has to be tested for all the physical and chemical properties of hypo sludge.
- Durability study on hypo sludge concrete paver blocks
- Investigations to study shrinkage and bond properties of HSPB concrete
- Study can also be done for different categories of road traffic.
- Study can also be done for as a replacement for fine aggregate.

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