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COST ANALYSIS: USE OF FLY ASH IN CONSTRUCTION

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ABSTRACT

From past several years the use of fly ash in concrete had a successful record. It also provides to mechanical and durability properties of concrete have been researched and implemented in actual structures. It is most commonly used in ready mix concrete. Fly ash is a waste generated by thermal power plants and it is big environmental concern. The investigation reported in this paper is carried for further studying effect on cost when fly ash is used for partial replacement of cement in concrete, brickwork and mortar.

I. INTRODUCTION

Fly ash is a waste product generated from thermal power plants and other industries. Many researches had shown cement can be successfully partially replaced by fly ash. Also there is problem of disposal of fly ash and hence it is cheaply available and this report studies effect on cost when fly ash used in building materials.

II. OBJECTIVES

- 1) To study effect on cost when fly is used in construction materials.
- 2) To determine exact change in cost when cement is partially replaced by fly ash in mortar and concrete.
- 3) To check feasibility of using fly ash in construction.

III. COST ANALYSIS

1) Partial replacement of cement by fly ash in concrete:

Volume of wet concrete = 1 m³

Volume of dry concrete = 52 % more of wet volume = 1.52 m³

Assume M-20 grade (1:2:4)

Volume of cement = $1.52/7 = 0.217$ m³

Cost of cement = $0.217/.035 \times 300 = 1860$ Rs

Replacing 5% cement by fly ash,

Cost by replacing 5% fly ash = cost of fly ash + cost of 95% cement

$$= 0.05 \times 0.217 \times 108 + 0.95 \times 0.217 \times 300 / .035$$

$$= 1768.17 \text{ Rs.}$$

Reduction in cost = $1860 - 1768.17 = 91.83$ Rs. /m³

From similar calculations the table given below is obtained:

Sr.No.	Grade of concrete	Conventional cost (Rs)	% of fly ash added	Reduction in cost (Rs)	Cost after replacement (Rs)	% reduction in cost
1.	M10(1:5:10)	3639	5	40.21	3598.79	1.1
			10	80.41	3558.59	2.2
			15	120.61	3518.39	3.31
2.	M15(1:3:6)	4250	5	64.32	4185.68	1.51
			10	128.65	4121.35	3.03
			15	192.97	4057.03	4.54
3.	M20(1:2:4)	4876	5	91.83	4784.17	1.88
			10	183.6	4692.4	3.77
			15	275.48	4600.2	5.65
4.	M25(1:1.5:3)	5444	5	119.91	5324.09	2.20
			10	231.41	5212.59	4.25
			15	353.5	5090.5	6.49

Table: % reduction in cost in concrete

2) Replacement of conventional brickwork by fly ash brickwork

Conventional brickwork cost = 5250 Rs. /m³.

Fly ash brickwork cost = 5125 Rs. /m³.

Reduction in cost = 125Rs. /m³

3) Partial replacement of cement by fly ash in mortar:

Wet volume = 1 m³

Dry volume = 25% more of wet volume =1.25 m³

For proportion 1:6,

Volume of cement = 1.25/7 = 0.181 m³

Cost of cement = 1551.43 Rs.

Replacing 5% cement by fly ash,

Cost by replacement 5% fly ash= 0.05 x 0.181x108 + 0.95 x 0.181 x 300/0.035 =1474.83 Rs.

Reduction in cost =76.6 Rs./m³

From similar calculations the table given below is obtained:

Sr.No.	Proportion	Conventional cost (Rs./m ³)	% of fly ash added	Reduction in cost(Rs./m ³)	Cost after replacement (Rs./m ³)	% reduction in cost
1.	1:6	3051.43	5	76.59	2974.84	2.51
			10	153.19	2898.24	5.02
2.	1:4	3542.86	5	105.8	3437.06	2.99
			10	211.59	3331.27	5.97
3.	1:3	3991.07	5	132.24	3858.83	3.31
			10	264.5	3726.57	6.63

Table: % reduction in cost in mortar

VI. CONCLUSION

It can be concluded that, with richer concrete or mortar mix volume of cement increases, thus it increases volume of fly ash used as replacement and ultimately increases reduction in cost.

REFERENCES

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