

# Cost Control of Multi Storied Residential Building

## Using unconventional building materials and precise scheduling

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**Abstract**—Cost control is an important issue in construction project management. For project control, managers would focus particular attention on items indicating significant deviation from budgeted amounts. In particular, the cost overruns in the labor and in the "other expense category" that would be worthy of attention by a project manager. Overruns in cost might be due to lower than expected productivity, higher than expected wage rates, higher than expected material costs, or other factors. Even further, low productivity might be caused by inadequate training, lack of required resources such as equipment or tools, or inordinate amounts of re-work to correct quality problems. Review of a job status report is only the first step in project control. With this project, by researching all the above mentioned parameters, it was made sure that cost of the demo house was controlled by optimization of manpower, timely procurement of materials and machinery and working the project as per schedule maintaining the desired quality standards thereby completing it within the stipulated budget.

**Keywords**—cost control, low cost housing, AAC Blocks, scheduling

### I. Introduction

Cost control is an important issue in construction project management. It is widely practiced by contractors and needs to be carried out throughout the life of a project. It is concerned with influencing the factors which create changes to the cost baseline to ensure that changes are beneficial and also in managing the actual changes when and as they occur, alongside monitoring cost performances to detect variances from plan, ensuring that all appropriate changes are recorded and preventing inappropriate or unauthorized changes from being included.

From Project Manager spending on the bulk procurements of the material to a Foreman spending on the sundry, everyone under the contractor spends money. With multiple resources handling expenditure it becomes difficult to direct the flow of money in overall cost controlled direction. It is here that the need of precise planning and scheduling of the procurement, construction activities, total work hours and timely approvals is realized.

While execution of project work the procedures for project control and record keeping become the ideal reliable tools for serving managers in tracking the financial status of project and the progress and problems of the project. The same tools, by default, become the comparative statement of alternative building materials, resource procurement map – study of the cash flow on human resource and procurement planning/analysis, forecast sheet that can indicate the future cost of materials and final cost of project due to the "other expense category"

It is possible to achieve the minimum cost of a project with timely procurement, efficient flow of construction activities, alternate building materials- to be chosen in order to reduce the daily labor wages, forecasting the appropriate risk factor, minimizing the use of construction material (Economic Design).

### II. METHODOLOGY

There are two ways, as mentioned below, through which attempt has been made to control the costs.

#### A. Precise scheduling and its implementation

Firstly, a project schedule is to be made. This should include the planning of day to day activities. Planning is only effective, when rightly executed. Hence, the construction activities should take place as planned and an attempt was made to finish it before time. Planning was done to eliminate extra labor hours which can in turn reduce daily wage expenditure at a later stage.

#### B. Use of Alternate building materials

Red bricks are one of the most pre-eminent materials used for construction. The carbon dioxide emissions in the brick manufacturing process have been certified as a relevant factor to global warming. Also, after the use of bricks it is observed that more efforts are required on the finishing of the structures. AAC Blocks is one of the alternatives of red bricks which is ideal for multi storied constructions due to its light weight and proper finish.

### III. SCHEDULING

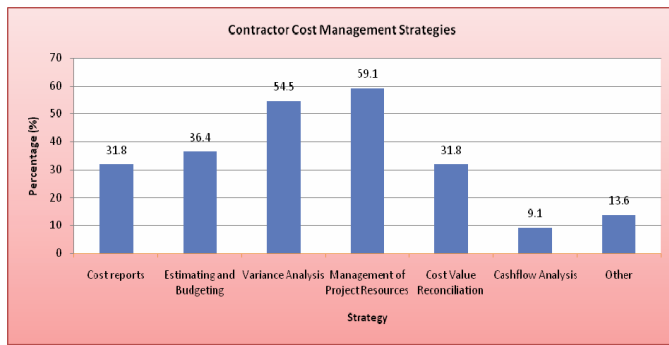


Figure 1: Cost Management Strategies on Building Projects  
(Benviolent Chigara, 2013)

The seven cost control techniques used by contractors on their sites were found to include use of: schedules, the project budget, inspection of works, cost reports, site meetings, monitoring of cost and work performance and quantity evaluation using the bills of quantities, and others did not have well defined techniques or did not even know there were traditional cost control procedures. The research was unable to establish concrete evidences that actually the stated techniques were effectively used as documents to prove the applications were found lacking or not there at all. The survey was able to firmly state that, "the problem of cost control is actually the lack of knowledge and inadequate planning for the implementation coupled with the poor management of construction resources" (Anuranjan Kumar, 2015)

Schedule of a project play important role in forecasting the cost of project ultimately. As shown in Figure 1, it is always very important that the resources are procured on time. At the Multi storied project, AG'S OFFICE CO-OPERATIVE HOUSING SOCIETY LIMITED, ATTAPUR, HYDERABAD, TELANGANA, INDIA the schedules were developed and the project was completed in duration of 20 months.

The project cost was reduced by 30% using the both strategies mentioned in methodology. Figure 2 represents the cash flow for the period of 21 months. The total cost of project would go up to 77.7 Crores which were brought down to 73.34 Crores by means of scheduling.

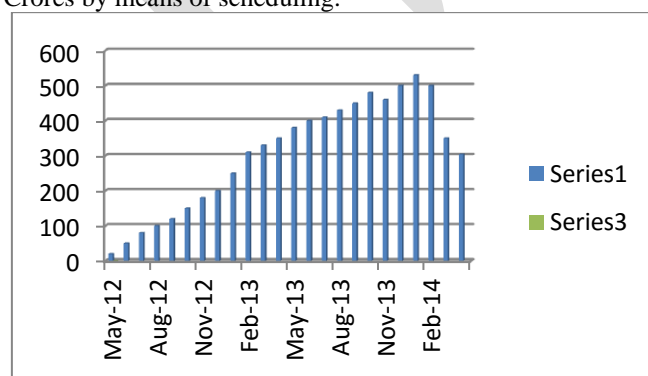


Figure 2: Flow of Cash from May 2012 to March 2014 (in lakhs)  
(Satyavani Projects and Consultants Pvt Ltd, 2014)

### IV. USE OF ALTERNATE BUILDING MATERIALS

#### A. XTRALITE AAC Blocks

AAC Blocks may be one of the solutions as a replacement to clay bricks. AAC blocks are a relatively new phenomenon in Indian construction industry. In spite of drastic growth in manufacturing of AAC, the real fact is that market share of AAC is very small as compared to the red bricks. Autoclaved Aerated Concrete (AAC) blocks are made of fly ash, aluminium powder and water. Autoclaved Aerated Concrete (AAC) blocks are smooth and almost eight times bigger than the red bricks and are lighter than the normal red clay bricks. The bricks are of typical size. They do not have much strength as compared to aerated concrete blocks. The larger size of AAC blocks leads to faster masonry works and reduces the cost of the project. AAC has an excellent property which makes it an excellent insulator i.e. the interior environment is easier to maintain. Autoclaved Aerated Concrete (AAC) blocks have light weight, high strength, good durability, heat preservation, sound insulation, fire proofing, impervious, good anchoring properties. Autoclaved Aerated Concrete (AAC) Block is a certified green building material, which is porous, non-toxic, reusable, renewable and recyclable, can be used for commercial, industrial and residential construction. It is found that around 6%, the cost of construction can be reduced by using AAC blocks.

The cost of savings of AAC with respect to bricks for buildings such as hospital, market, school and industrial shed are shown in chart -4. From the above graph it is seen that for public building such as hospital, shopping complex, school building and industrial shed, the average cost saving for AAC block is about 15.3%. For residential building, as number of room increases, built-up area also increases and the cost of saving in AAC decreases which is minimum about 14.5%. Similarly, the cost of saving in cement decreases with increase in built up area, which is about 43.27%. (Shwetha Rathi, 2016)

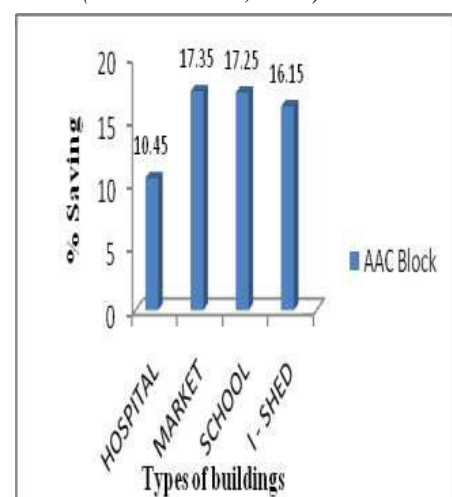


Figure 3: Comparison of cost of AAC Blocks (Shwetha Rathi, 2016)

### B. UltraTech FixoBlock

UltraTech FixoBlock is made from a unique combination of cement, graded sand and proprietary additives. The unique chemical combination enables this mortar to be more compact, thinner and stronger. At only 3 mm thick, it is far thinner than the conventional mortar which is between 12-18 mm. Being pre-mixed it is easy to use and also ensures the compaction of interlocking bricks making the bonds tougher and more durable.

### C. UltraTech ReditPlast

UltraTech ReditPlast is used in place of conventional plastering. ReditPlast is a convenient and easy-to-use plaster that is cohesive and binds better to the base. Prepared with a mix of special binders and additives, it is water resistant with high quality and sustainability. It minimizes cracks which develop due to shrinkage.

A model comparative statement was made for a 1000 square feet house to study the variance in costs. Table 1.a shows the bill of quantities for traditional construction and Table 1.b shows the bill of quantities of the construction using alternate building materials.

**Table 1.a: Bill of Quantities**

Traditional Materials					
S.No.	Resource	Quantity	Unit	Rate(in Rs)	Total
1	Red Bricks	12000	Nos	6	72000
2	Cement	420	Bags	310	130200
3	Fine Aggregate	31	CUM	1130	35030
4	Coarse Aggregate	27	CUM	742	20034
5	Steel	2500	Kg	45	11250
6	Putty	3500	SFT	11	38500
7	Labour	1000	SFT	180	180000
8	Total				588264

**Table 2: Bill of Quantities**

Special Materials				
Resource	Quantity	Unit	Rate(in Rs)	Total
UltraTech XTRALITE	750	Nos	89	66750
Cement	300	Bags	310	93000
Fine Aggregate	15	CUM	1130	16950
Coarse Aggregate	27	CUM	742	20034
Steel	2250	Kg	45	101250
UltraTech FixoBlock	10	Bags	700	7000
UltraTech ReditPlast	28	Bags	480	13440
Labour	1000	SFT	160	160000
Total				478424

## V. CONCLUSION

- The cost of the construction of the project by using unconventional materials has been controlled and around 6% savings have been attained, which according to research can go up to 20% for small built-up areas.
- Precise scheduling can act as a register for monitoring costs and flow of resources.
- Comparison Summary:

Variation in Cost ( Savings )	109840
Percentage Variation ( Savings % )	18.6%
Cost Comparison of 564140 SFT AG'S PROJECT ( In Crores )	
Cost using Traditional Materials	77.98
Cost using Special Materials	73.3
Variation in Cost ( Savings )	4.68
Percentage Variation ( Savings % )	6.0

- After a thorough analysis it was found that the overall costs of the project can be controlled by these techniques and the extent of the savings depend upon the planning and its execution of the schedule.

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## REFERENCES

- Anuranjan Kumar, O. P. (2015). Cost Control in Construction Planning On Site. *International Journal of Science, Engineering and Technology*, 84-87
- Benviolent Chigara, T. M. (2013). AN ANALYSIS OF COST MANAGEMENT STRATEGIES. *International Journal of Sustainable Construction Engineering & Technology (ISSN: 2180-3242)*, 13
- Satyavani Projects and Consultants Pvt Ltd. (2014). AG's House Project Estimate.
- Shwetha Rathi, P. K. (2016). COST EFFECTIVENESS OF USING AAC BLOCKS FOR BUILDING CONSTRUCTION IN RESIDENTIAL BUILDING AND PUBLIC BUILDINGS. *International Journal of Research in Engineering and Technology*, 517-5