LOW COST HOUSING APPROACH FOR PMAY

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Abstract: The basic necessity of every human is a shelter, the shelter now a days is defined as to have own house with all amenities. So as to have a better living condition to live in peace and harmony However due to drastic increase in prices of the property rate in India it is difficuit to buy own house. Due to the need of such, the governments have focused on this issue and Aimed to provide house to all human being as it is the basic need of the world. PMAY is one of the solutions to accommodate people by paying minimum cost. In this paper, the concern of low cost housing has been focussed with help of case studied in pune region.

Index Terms **- Low cost housing, PMAY, Microsoft excels estimation.**

I. INTRODUCTION

India being a developing country mainly faces the problem of poverty and low income due to which it becomes difficult for the common man to build or purchase his own home thus leading to large scale of houselessness. PMAY is the low cost housing scheme but a civil engineering only knows the fundamental in doing so where as the common people are not aware of this knowledge.

This producing various problem for which the government has to invest in to counter it. This can be easily solved by provide them with sustainable house. The government has undertaken the Pradhan Mantri Awas Yojana which initiated on 2015 and committed to provide 20 million housing units by 15 Aug 2022.To have a slum free India. According to the mission guideline an affordable housing project shall have minimum 35 % of the houses for the economical weaker section (EWS) category and annual income up to 3 lacks. With carpet area is 30 m^2, for low income group which has income between 3 lacks to 6 lacks with carpet area 60 m^2.

By using concept of PMAY we have focused on studying how the cost effectiveness related to the material is been achieved and the study is also oriented to find any advance technique or material that can be used further for reducing the cost of construction for which we have site visited various vendors for finding such material and technique that are been implemented in the low cost housing scheme and how the same can be implemented in the scheme.

Low cost housing can be defined as "it is considered a concept of reduction in the cost of construction without sacrificing the strength required for the performance of the building." Also it can be defined as "Affordable housing refers to housing unit that are affordable by that section of society whose income is below the medium household income."

II. RESEARCH METHODOLOGY

In this section we have discussed about the comparative study of various building materials used in the construction of non structural elements. The study related to the materials such as terracotta blocks, gypsum plaster, PVC tiles to be an alternative to the conventional materials such as bricks, plastering coat, flooring work respectively.
Following are the worksheet for various materials.

2.1 BRICKWORK USED IN CONSTRUCTION

2.1.1 CONVENTIONAL BRICK USED IN CONSTRUCTION:

Conventional bricks are basically used in construction works in our country. As the use of conventional bricks on site the basic size of these bricks are 19 x 9 x 9 cm which are without mortar/dry bricks, 20 x 10 x 10cm this is the size of brick with application of mortar, The calculation of bricks in requirement for the construction of per cubic meter of brick wall/brickwork. Brickwork carried out in cement mortar 1:6.
Volume of brick without mortar: 0.19 x 0.09 x 0.09 = 0.001539 cu m.
No of bricks: 1 / 0.001539 = 650 app.
Volume of bricks with mortar: 0.2 x 0.1 x 0.1 = 0.002 cu m
No of bricks: 1 / 0.002 = **500 nos**.
Volume of 500 bricks without mortar: 500 x 0.001539 = 0.7695 cu m.
Required volume of cement mortar: 0.2305 cu m.
In order to find dry volume we need to multiply 33% bulkage of sand.
Therefore dry volume = 0.2305 x 1.33 = 0.306565 cu m.

Required cement quantity = 0.306565 x 1/7 x 1400 = **64 kg app**.
Required sand quantity = 0.306565 x 6/7 = **0.263 cu m / 420.8 kg.**

2.1.2 ALTERNATIVE BRICK USED IN CONSTRUCTION

List of alternatives materials used in construction instead of bricks are as follows:

1. Teracotta hollow blocks.
2. Laterite stone blocks.
3. Interlocking mud block.
4. Soil stabilized block.
5. Siforex block/ AAC blocks.
6. Porotherum blocks.

2.1.3 TERACOTTA HOLLOW BLOCKS:

If use of terracotta blocks 500 x 300 x 200 mm, cement consumption can be reduced for construction of wall, internal as well as external plaster can be deducted, for conventional brickwork 65kg of cement is required per cu m of work which can be reduced up to 11-18 kg of the requirement by the use of these blocks cost per unit of these blocks is around 20-25Rs.The calculation of bricks in requirement for the construction of per cubic meter of brick wall/brickwork. Brickwork carried out in cement mortar 1:6.
Volume of brick without mortar: 0.5 x 0.3 x 0.2 = 0.03 cu m.
No of bricks: 1 / 0.03 = 34 app.
Volume of bricks with mortar: 0.51 x 0.31 x 0.21 = 0.033 cu m
No of bricks: 1 / 0.033 = **30 nos**.
Volume of 500 bricks without mortar: 30 x 0.03 = 0.9 cu m.
Required volume of cement mortar: 0.1 cu m.
In order to find dry volume we need to multiply 33% bulkage of sand.
Therefore dry volume = 0.1 x 1.33 = 0.133 cu m.
Required cement quantity = 0.133 x 1/7 x 1440 = **28 kg app**.
Required sand quantity = 0.133 x 6/7 = **0.144 cu m / 230.9 kg.**

2.2 PLASTERING WORK USED IN CONSTRUCTION:

2.2.1 CONVENTIONAL INTERNAL PLASTERING WORK:

The calculation of plastering in requirement for the construction of per cubic meter unit Plastering work carried out for 1 cubic meter. Plastering carried out in cement mortar 1:6, with thickness 12mm.
Wet volume of mortar = 1 x 0.012 = 0.012 cu m.
For the calculation of dry volume consider sand bulkage as 33% & wastage as 20%.
Dry volume of mortar = (1+0.33+0.2) x 0.012 = 0.0184 cu m
Required cement quantity = 0.0184 x 1/7 x 1440 = 3.79 kg.
Required sand quantity = 0.0184 x 6/7 x1650 = 26 kg.
Water required = 20% of total dry quantity = 0.2 x (3.79 + 26) = 5.96 lit.
Plaster of Paris coat required for 12mm thickness plaster
Required quantity of plaster = 0.012 x 800 =9.6 kg.
Water required = 20% of total dry quantity = 0.2 x 9.6 = 1.92 lit.
Therefore total water required = 7.88 lit.

2.2.2 CONVENTIONAL EXTERNAL PLASTERING WORK:

As per the standards external plastering work shall not having any alternative as it needs to with stand various natural effects, the work is mainly carried out in double coat plaster up to 20mm thickness in cement mortar of 1:6.
Wet volume of plaster = 0.02 cu m.
Adding 30% for wastage, wet volume = (0.3 x 0.02) + 0.02 = 0.026 cu m.
Dry volume of plaster = 1.53 x 0.026 = 0.0398 cu m.
Required cement quantity = 0.0398 x 1/7 x 1440 = 8.19 kg.
Required sand quantity = 0.0398 x 6/7 x1650 = 56.29 kg.
Water required = 20% of total dry quantity = 0.2 x (8.19 + 56.29) = 12.89 lit.

2.2.3 ALTERNATIVE GYPSUM PLASTERING MATERIAL USED IN CONSTRUCTION

This type of plastering is mainly carried out in the internal plastering work, it is most widely used in the construction industry which has many useful properties such as increase in speedy work which is a reduction of 70% of the work carried out in conventional, it does not need curing which reduces the curing period, surface is smooth which can be directly painted. it is available in 25 kg per bag costing around 160 Rs.

A coat of 21 sq ft is applicable per bag of gypsum plaster, The calculation of plastering in requirement for the construction of per cubic meter unit.

Volume of dry plaster: 1.95 cu m = 25 kg bag, 1cu m = 12.82 kg.

Water required = 20% of total dry quantity = 0.2 x 12.82 = 2.56 lit.

III. RESULTS AND DISCUSSION

As per the above calculation for the requirement of quantities for various works per unit quantities are mentioned below

Brick work plays a vital role in the construction industry; it accommodates a large part in the structure and requires materials as well as labor support for the completion of the work.

Table 1: BRICK WORK MATERIAL ESTIMATION.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BRICKS	UNITS	500	6	3000
CEMENT	KG	64	4.68	299.52
SAND	KG	420.8	1.55	652.24
WATER	LIT	175	0.005	0.875
CURING WATER	LIT	175	0.005	0.875
TOTAL:				3953.51

Table II: BRICK WORK MANPOWER ESTIMATION.

DESCRIPTION	UNIT(No.)	QTY(m^3)	RATE	AMOUNT
MASON	1	0.157	600	94.2
MAZDOOR	2	0.157	400	125.6
FEMALE HELPER	1	0.079	250	19.75
BHISTI	0.5	0.5	200	50
TOTAL:				289.55

Table III: BRICK WORK MATERIAL ESTIMATION USING TERRACOTA BLOCK.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BRICKS	UNITS	30	25	750
CEMENT	KG	28	4.68	131.04
SAND	KG	230.9	1.55	357.895
WATER	LIT	100	0.005	0.5
CURING WATER	LIT	100	0.005	0.5
TOTAL:				1239.935

Table IV: BRICK WORK ESTIMATION FOR MANPOWER.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT
MASON	1	0.109	600	65.4
MAZDOOR	1	0.109	400	43.6
FEMALE HELPER	1	0.055	250	13.75
BHISTI	0.5	0.5	200	50
TOTAL:				172.75

Total cost for conventional brick work: Rs 4243.06/-(per cubic meter)

Total cost for alternative Terracotta Blocks work: Rs 1412.685/-(per cubic meter)

As pre the above observation it clearly states that the cost utilized in the construction of brickwork per cubic meter is least with the use of terracotta blocks instead of the conventional brick construction.

Plastering work for both internal and external face: Plastering work also plays an important role in finishing the brickwork; it also plays a vital role in protection of the external face of the brickwork from external environmental effects. The quantity of plaster required per square meter is stated below also with the man power required.

Table V: PLASTERING MATERIAL ESTIMATION FOR INTERNAL PLASTER.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT (Rs.)
CEMENT	KG	3.79	5.2	19.708
SAND	KG	26.02	1.55	40.331
WATER	LIT	7.88	0.005	0.0394
CURING WATER	LIT	175	0.005	0.875
PLASTER OF PARIS	KG	9.6	4.8	46.08
TOTAL:				107.0334

Table VI: PLASTERING MANPOWER ESTIMATION FOR INTERNAL PLASTER.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT (Rs.)
MASON	0.075	1	800	60
HELPER	0.075	1	400	30
BHISTI	0.5	1	200	100
TOTAL				190

Table VII: PLASTERING MATERIAL ESTIMATION FOR ALTERNATIVE MATERIAL.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT (Rs.)
GYPROC ONE COAT ELITE	KG	12.82	6.4	82.048
WATER	LIT	2.56	0.005	0.0128
TOTAL:				82.0608

Table VIII: PLASTERING MANPOWER ESTIMATION FOR ALTERNATIVE MATERIAL.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT (Rs.)
MASON	0.075	1	650	48.75
HELPER	0.075	1	300	22.5
BHISTI	0.5	1	200	100
TOTAL				171.25

Table IX: PLASTERING MATERIAL ESTIMATION FOR EXTERNAL PLASTER.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs.)
CEMENT	KG	8.19	5.2	42.588
SAND	KG	56.29	1.55	87.2495
WATER	LIT	12.89	0.005	0.06445
CURING WATER	LIT	175	0.005	0.875
TOTAL:				130.77695

Table X: PLASTERING MANPOWER ESTIMATION FOR EXTERNAL PLASTER.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT (Rs.)
MASON	0.075	1	800	60
HELPER	0.075	1	400	30
BHISTI	0.5	1	200	100
TOTAL				190

Table XI: PLASTERING MANPOWER ESTIMATION FOR EXTERNAL PLASTER.

DESCRIPTION	UNIT	QTY	RATE	AMOUNT (Rs.)
MASON	0.075	1	850	63.75
HELPER	0.075	1	500	37.5
BHISTI	0.5	1	200	100
TOTAL				201.25

Total cost for conventional internal plastering: Rs 297.0334/-(per square meter)

Total cost for conventional external plastering: Rs 320.77/-(per meter square upto 8 meter), Rs 332.02/-(per meter square above 8)
Total cost of alternative plastering work for both faces: Rs 253.3108/-(per meter square)
As pre the above observation it clearly states that the cost utilized in the construction of plastering work per square meter is least with the use of gypsum plaster instead of the conventional mortar plaster in construction.

IV CONCLUSION

AFTER STUDYING THIS PROJECT WORK WE CAN CONCLUDE LOW COST HOUSING IS ESSENTIAL FOR VARIOUS GOVERNMENT SCHEMES, SUCH AS PMAY, AS A PART OF CIVIL ENGINEERING USE OF SMART MATERIALS, ADVANCE TECHNOLOGIES AND EQUIPMENTS WILL HELP TO SOLVE THE TIME AND COST REQUIRED FOR CONSTRUCTION. IN OUR PROJECT WORK USE OF TERRACOTTA BLOCK, GYPSUM PLASTER SHOWS THAT COST OF A TRADITIONAL BUILDING CAN BE REDUCED BY SMARTLY CHOOSING THESE MATERIALS. HENCE LOW COST HOUSING IS AN APPROACH TOWARDS PMAY, SMART MATERIALS AND ADVANCE TECHNOLOGIES SUPPORTED BY A PROPER MANAGEMENT ARE THE KEY PARAMETERS FOR ITS SUCCESSFUL COMPLETION.

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