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# AN EFFICIENT & EFFECTIVE SOLUTION OF CONSTRUCTION WASTE FROM PROJECT MANAGEMENT PERSPECTIVE

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**Abstract -** *India is one of the largest developing countries with the second largest population in the world Currently there is a huge scope of work related in India due to which a large amount of construction is taking place everywhere in India Over time there have been many new improvements in construction including a lot of software based on which we can schedule the planning and plan this particular construction in a way that makes it easier to know how the construction will work throughout the year and how much work will be done Remain With the increase in construction, the waste of material is also increasing. It accounts for 40 to 50 per cent of the total construction This can reduce construction costs if used with calculation In this this technique , if material is used and ordered by the project management and proper preservation is done, wastage of material can be prevented so that effective and efficient material can be solved by construction management project waste*

***Key Words***: **Construction waste, construction waste management, Waste Minimization, Project Management**

## 1.INTRODUCTION

The construction industry is one of the fastest growing industries in India with a lot of money invested and a lot of material wasted. The construction industry involves a large number of laborers and requires a lot of time and cost to work with, so it is very important to have a management that can save money, This construction requires careful management of each of its activities and also its cost analysis, a very large amount of material waste is generated at the time of construction, which is a very high cost if the waste is calculated. The reasons behind the increase in construction work in India are population growth and urbanization due to which the demand for construction has been increasing. Construction waste has been on the rise due to poor construction work at such times. Disposal of construction waste is an important issue At present, where construction is taking place, its waste is dumped in the roadside area near it, which is also causing traffic problems. There is a lot of waste in this construction that we can reuse, reuse reduce recycle and be useful in its cost estimation. Construction waste is generated from construction, renovation, repair, and demolition of houses, large building structures, roads, bridges, piers, and dams waste is made up of wood, steel, concrete, gypsum, masonry, plaster, metal, and asphalt. While retrievable items such as bricks, wood, metal, titles are recycled, the concrete and masonry waste, accounting for more than 50% of the waste from construction and demolition activities, are not being currently recycled in India

### 1.1 Objective

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| Saving Environment |
| Focus on estimations & costs |
| Decelerate resource use |
| Reduce cost over run |

### 1.2 Need To Study

This study is necessary to give an estimate of the amount of material consumed by this and to estimate the engineer contractor labor owner material and how much it will cost. How much is the consumption? Estimation of usage will make it easier to order so that material waste is minimized

### 1.3 Research Methodology

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|---|
| Qualitative approach |
| Quantitative approach |

It is imperative to visit the site to get all kinds of information about the site and construction and how the waste is generated Useful for understanding the building with the help of architect by which we can get statistic about the construction so that it is easy to know how much material will be used for work How much will be used for rods and what will be its contingency by drawing of structure and when will it be well used Study all the plans on site with the help of supervisor and study the seat of how much material will be used for each activity Although all types of material are estimated, different types of waste are generated and how much more material is used than the estimated material

## 2. DATA COLLECTION

| | |
|---|---|
| Project type | Residential |
| Plot size | 680 var |
| Built up area | 27340 sq.ft |
| Carpet area | 16275 sq.ft |
| Owner | Neerali Group |
| Architect | Hemal bhatt |
| Structure engineer | Atul vora |
| Site engineer | Yash bhatt |
| Height of building | G+5 |
| Flats of | 3 bhk / 2 bhk |

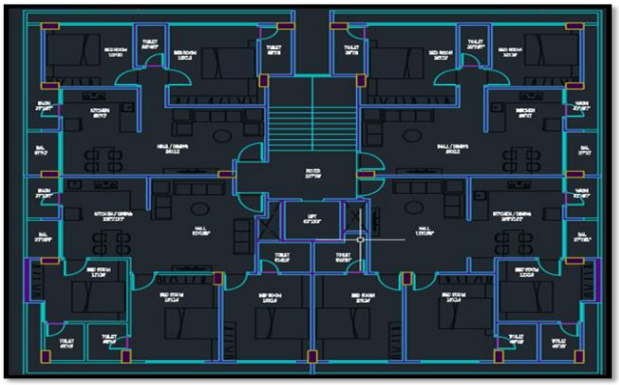
| location | Bhavnagar |
|---|---|

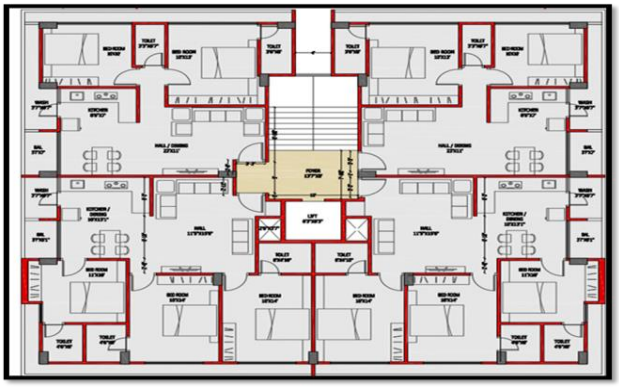
### 2.1 Prize of material at the site

1. Concrete of M25 :- 4100/ cubic meter
2. Bricks 4.5 / pec
3. Cement 340rs / bag
4. Tiles 320rs / pec
5. Sand 600rs / ton
6. Electric wire 1990 / roll ( Roll is 90 m)
7. Steel 55rs / kg (as per date of 4/5/21)

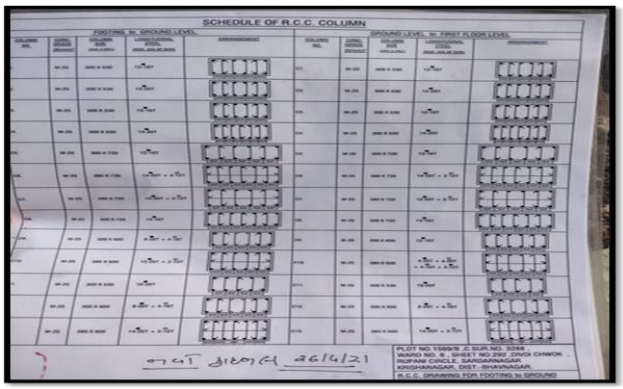
## 3. DATA ANALYSIS

### 3.1 Architect Drawing





### 3.2 Structure Drawing




### 3.3 Percentage of Waste

| Material | Permissible waste of % | Actual waste of % at site |
|---|---|---|
| Cement | 1 % to 1.5 % | 2 % to 3 % |
| Sand | 2 % to 3 % | 4 % to 5 % |
| Brick | 8 % to 10 % | 12 % to 13 % |
| Tiles | 5 % to 7 % | 8 % to 10 % |
| Concrete | 3 % to 4 % | 4 % to 5 % |
| Wire | 1 % to 2 % | 2 % to 3 % |
| Reinforcement | 6 % to 8 % | 14 % to 20 % |

### 3.4 Concreting Price Variation

3.4.1 Quantity of Concreting

| Area | Cubic Meter | Price |
|---|---|---|
| Slab/Beam/Footing/Column | 1050 Cu.m | 43,05,000 Rs. |

3.4.2 Actual Waste

| Area | Cubic Meter | Price |
|---|---|---|
| Slab/beam/Footing/Column | 41 Cu.m | 1,68,100 Rs. |

3.4.3 Variation Of Actual and Permissible Price

| Actual Waste | Permissible Waste | Variation Of Price |
|---|---|---|
| 1,68,100 Rs. | 1,31,200 Rs. | 36,900 Rs. |

### 3.5 Brick Work

3.5.1 Quantity Of Brick Work

| Material | Quantity | Price | Total Price |
|---|---|---|---|
| Bricks | 3,51,000 | 4.5 Rs/piece | 15,79,500 Rs. |
| Cement | 884 | 340 Rs/Bag | 3,00,560 Rs. |
| Sand | 294 | 600Rs/Ton | 1,76,400Rs. |

3.5.2 Actual Waste

| Material | Quantity | Price | Total Price |
|---|---|---|---|
| Bricks | 45630 piece | 4.5 Rs/piece | 2,05,335 Rs. |
| Cement | 18 Bag | 340 Rs/Bag | 6,120 Rs. |
| Sand | 11 Ton | 600 Rs/Ton | 6,600 Rs. |

3.5.3 Variation Of Actual and Permissible Price

| Material | Actual Waste | Permissible Waste | Variation Of Price |
|---|---|---|---|
| Bricks | 2,05,335 Rs. | 1,26,326 Rs. | 79,009 Rs. |
| Cement | 6,120 Rs. | 3,060 Rs. | 3,060 Rs. |
| Sand | 6,600 Rs. | 3,528 Rs. | 3,072 Rs. |

### 3.6 Reinforcement

3.6.1 Quantity Of Reinforcement

| Size | Weight | Price |
|---|---|---|
| 8 mm | 22,723 kg | 12,49,765 Rs. |
| 10 mm | 11,361 kg | 6,24,855 Rs. |
| 12 mm | 14,250 kg | 7,83,750 Rs. |
| 16 mm | 18,862 kg | 10,37,410 Rs. |
| 20 mm | 320 kg | 17,600 Rs. |
| TOTAL | 67,516 kg | 37,13,380 Rs. |

3.6.2 Actual Waste

| Total Weight | Waste in % | Waste of kg | Price of kg | Price of Waste |
|---|---|---|---|---|
| 67,516 kg | 13 % | 8,777.08 kg | 55 Rs/kg | 4,82,739 Rs. |

3.6.3 Variation Of Actual and Permissible Price

| Actual Price | Permissible Price | Variation |
|---|---|---|
| 4,82,739 Rs. | 2,78,503 Rs. | 2,04,236 Rs. |

### 3.7 Flooring

3.7.1 Quantity Of Flooring Work

| Material | Quantity | Price | Total Price |
|---|---|---|---|
| Tiles | 4640 piece | 320 Rs/piece | 14,84,800 Rs. |
| Cement | 651 Bag | 340 Rs/Bag | 2,21,340 Rs. |
| Sand | 91 Ton | 600 Rs. | 54,600 Rs. |

3.7.2 Actual Waste

| Material | Quantity | Price | Total Price |
|---|---|---|---|
| Tiles | 372 piece | 320 Rs. | 1,19,040 Rs. |
| Cement | 13 Bag | 340 Rs. | 4420 Rs. |
| Sand | 3.64 Ton | 600 Rs. | 2184 Rs. |

3.7.3 Variation Of Actual and Permissible Price

| Material | Actual Waste | Permissible Waste | Variation Of Price |
|---|---|---|---|
| Tiles | 1,19,040 Rs. | 72,240 Rs. | 46,800 Rs. |
| Cement | 4420 Rs. | 2040 Rs. | 2380 Rs. |
| Sand | 2184 Rs. | 1092 Rs. | 1092 Rs. |

### 3.8 Electric Wiring

3.8.1 Quantity of Electric wiring

| Color | Meter | Total wire | Price |
|---|---|---|---|
| Yellow | 600 | 5880 meter wiring work | 1,23,480 Rs. |
| Black | 2000 | | |
| Green | 2000 | | |
| Red | 280 | | |
| Blue | 1000 | | |

3.8.2 Actual Waste

| Wire | Percentage of waste | Total Price |
|---|---|---|
| 5880 meter | 2% | 2470 Rs. |

3.8.3 Variation Of Actual and Permissible Price

| Total wire | Actual Cost | Permissible Cost | Variation |
|---|---|---|---|
| 5880 meter | 2470 Rs. | 1853 Rs. | 618 Rs. |

### 3.9 Plastering Work

3.9.1 Quantity Of Plastering Work

| Material | Quantity | Price | Total Price |
|---|---|---|---|
| Cement | 691 Bag | 340 Rs/bag | 2,34,940 Rs. |
| Sand | 160 Ton | 600 Rs/Ton | 96,000 Rs. |

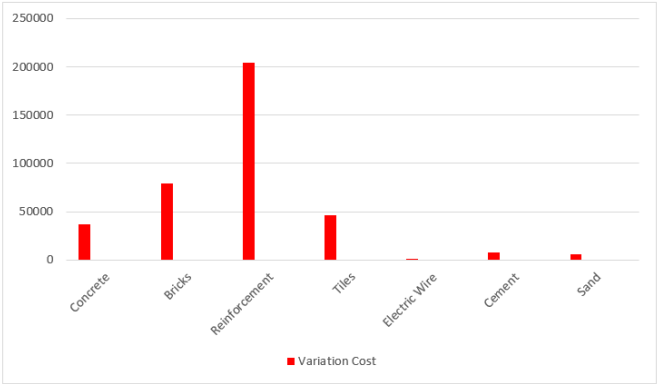
3.9.2 Actual Waste

| Material | Quantity | Price | Total Price |
|---|---|---|---|
| Cement | 14 Bag | 340 Rs/Bag | 4760 Rs. |
| Sand | 6.4 Ton | 600 Rs/Ton | 3840 Rs. |

3.9.3 Variation Of Actual and Permissible Price

| Material | Actual Waste | Permissible Waste | Variation Of Price |
|---|---|---|---|
| Cement | 4760 Rs. | 2380 Rs. | 2380 Rs. |
| Sand | 3840 Rs. | 1920 Rs. | 1920 Rs. |

### 3.10 Graph of Variation Cost




### 3.11 Taking Care of these things reduces material damage

3.11.1 Concrete

| |
|---|
| Care during transportation. |
| Care during laying of pipelines. |
| Calculation done according to specified plans |
| Suitable supervision |

3.11.2 Steel

| |
|---|
| Suitable placing |
| Suitable cutting |
| Suitable binding |
| Use cuttings as stirrups, extra bars and lapping |

3.11.3 Cement & Sand

| |
|---|
| Take care in transportation |
| Well storage |

3.11.4 Bricks & Tiles

| |
|---|
| Suitable quality |
| Suitable placing |
| Suitable storage |

## 4. CONCLUSION

This conclusion shows that waste was made in construction industry, material was wasted during any activity, The foremost roots of this construction waste such as unsuitable paper work, design modification, site management, attitude of the workers transportation, material ordering, material stowage, material treatment, poor workmanship, etc. are the waste of material at the place of construction, In such matters, there would be synchronization between the builder, the architect, the engineer and the contractor And Money matters need to be coordinated, If material waste occurs at the site or in large amounts so that it should be calculated open and the amount of waste of such material is large, some construction sites were such that the material is used as calculated, If enough material was calculated, well-maintained and used, a lot of savings can be made on the construction site and some types of material waste can be reused, so that waste material were used instead of Virgin material, The amount of waste permissible during the construction activity should be as much as possible So as to save a large amount, Material amount for 40 to 50 per cent of the project cost, If done through rate analysis and done properly, it was called efficient and effective solution of construction waste from project management perspective

## 5. FUTURE SCOPE

There will a lot of scope for this in the future if planning and scheduling was done before starting the construction work and an approximation is given of the amount of material to be used and an order was given and labor and proper training are given to use the material properly. Consumption was reduced. Proper use of the material in this way saves a large amount of money which can be used more in construction and the cost of construction can be reduced by reusing the material waste which increases. If this is done, construction costs can be reduced and the environment can be protected. Properly covered it will withstand a great deal of adverse conditions and will save time and money

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