

Case Study on Construction and Demolition Waste Generation by M G Road and K R Market Road in Davangere

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Abstract - Construction projects are one of the sources of solid waste in the urban area. Various researches in developed countries indicate that contribution of construction waste in the urban area tend to increase. Implementation of construction waste management hierarchy can be an approach to manage and reduce the waste. Material waste is a term from the amount of waste material percentage and is one of the serious problems in the implementation of road construction project. In this paper, we are going to calculate the average percentage of waste material in road construction projects around the Davangere city.

Key Words: Construction and Demolition waste, Road construction project, Sustainable construction, C&D waste estimation methodology.

1. INTRODUCTION:

Construction and demolition waste is a mixture of surplus materials generated during new construction, renovation and demolition of buildings, roads, flyovers and other structures. The focus of this study includes waste generated during new road construction project. These wastes can be used as landfill, base or sub base in road construction, embankment fill, and railway ballast and most importantly in aggregate replacement method for the formation of recycled concrete.

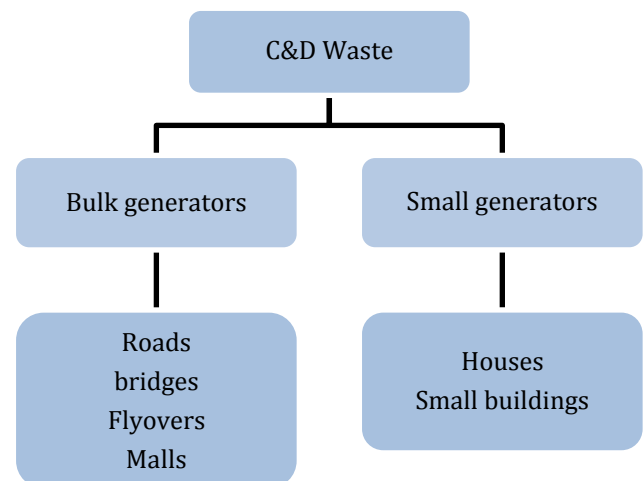
1.1 Classification of C&D waste components:

C&D waste can be classified into two components namely major components and minor components. Major components includes cement concrete, bricks, cement plaster, steel from R.C.C, stones, timber, etc. and minor components includes conduits, C.I pipes/iron pipes/plastic pipes, electrical fixtures, panels, glass, etc.

1.2 Sources of construction and demolition waste:

Generally there are two sources of waste generation of waste materials namely bulk generators and small generators. The classification of sources is given the figure infrastructure and real estate sector are the bulk

generators of waste. Construction and repairs of roads, bridges, flyovers, etc. are classified under the figure infrastructure development sector. Real estate sector consists of housing, industrial and commercial building construction and demolition of unauthorized structures.



2. METHODOLOGY:

To develop this study, two roads of davangere city are selected they are M G road of 415m length and K R market road of 2330m length. These two roads of davangere city has been analyzed to estimate the quantity of C&D waste likely to be generated.

Step followed are:

- Collected the detailed estimates of road construction projects i.e., detailed examination of M G road and K R market road from Davangere smart city limited office [DSCL].
- Identified the basic type of waste materials commonly found in road construction stages.
- Analyzed and designed the percentage of waste factors for different items of works, Table 2.1 shows the percentage of waste factor for construction items.

Table 2.1: Percentage waste factors for construction items

Sl. No.	Item of work	Percentage of waste factor
1	Construction of cement concrete pavement	8.0
2	Providing and laying heavy duty cobble stones	0.8
3	Painting line, dashes, arrows	0.8
4	Providing murrum	0.8
5	Construction of granular sub base	0.8
6	Providing and fixing precast solid C.C kerb stones	0.8
7	Supplying and laying, joining of pipes	0.2
8	Refilling available earth	0.8
9	Removal of unserviceable soil	0.8
10	R.C.C manhole cover	0.2
11	Providing and laying in position P.C.C	8.0
12	Providing and fixing M.S grill work	0.8
13	Removing and refixing stone slabs of drains	0.8
14	Providing and laying heavy duty cobble stones	0.8
15	Supplying ductile, UPVC pipes	0.2
16	Provision for shifting of cables	0.8
17	Providing and fixing PVC end caps, medium duty SFRC frame	0.8

- Calculated the construction and demolition wastes.

3. CALCULATIONS:

- For each quantity, item of work and percentage waste factor is multiplied using table 2.1 of percentage waste factor for construction items to estimate the quantity of construction waste.

- The summation of construction and demolition waste gives the quantity of C&D waste.

For example,

Table 3.1: Detailed estimation of road

Sl No.	Description of item	Unit	Quantity
1	Dismantling of existing cement concrete pavement	M ³	319.55
2	Earthwork excavation	M ³	593.45
3	Providing and laying in position of P.C.C	M ³	10.7
4	Supplying HDPE pipes	M ³	842

Table 3.2: Calculated construction and demolition waste quantity by using detailed estimation and percentage waste factor table

Sl No.	Description of item	Unit	Quantity	Percentage waste factor	Construction waste quantity [CWQ]	Demolition waste quantity [DWQ]
1	Dismantling of existing cement concrete pavement	M ³	319.55	-	-	319.55
2	Earthwork excavation	M ³	593.45	-	-	593.45
3	Providing and laying in position P.C.C	M ³	10.7	8	0.856	-
4	Supplying HDPE pipes	M ³	842	0.2	1.684	-
Total =					2.54 M ³	913 M ³

- Total C&D waste quantity = Construction waste quantity + demolition waste quantity
 = 2.54+913
 = 915.54 M³

4. RESULT:

Table 4.1: C&D waste quantity for M G road

Sl No.	Description of item	Unit	Quantity	C&D waste quantity
1	Smart roads: Dismantling of cement concrete pavement, earthwork excavation, compaction, painting, marking, etc.	M ³	10255	1162.6
2	Storm water drain pipes	M ³	5810.2	2479.3
3	Road gullies	M ³	2.8882	0.3319
4	Road inspection chambers	M ³	870.9	261.588
5	Water supply	M ³	2263.96	642.91
6	Sewerage collection system	M ³	1220.1	245.19
7	Gas pipe	M ³	1650.3	810
Total C&D waste generated by M G road =				5601.92

Table 4.2: C&D waste quantity for K R market road

Sl No.	Description of item	Unit	Quantity	C&D waste quantity
1	Smart roads: Dismantling of cement concrete pavement, earthwork excavation, compaction, painting, marking, etc.	M ³	24753	17411
2	Storm water drain pipes	M ³	1770.43	375.99
3	Road gullies	M ³	35.31	16.48
4	Road inspection chambers	M ³	627.53	424.39
5	Water supply	M ³	778.76	590.68
6	Sewerage collection system	M ³	891.33	370.53
7	Gas pipe	M ³	82.32	40.40
Total C&D waste generated by K R market road =				19229.47

5. CONCLUSIONS:

This case study of estimation is based on the technical, Environmental and Economic factors indicated that waste materials estimated are listed below and their significant potential are to replace conventional waste. The general legislation, local liability and research projects related to waste materials are outlined in this report. The waste materials includes are cement, concrete, duty cobble stones, murrum, kerb stones, bricks, unserviceable soil, pipes, manhole covers, TMT / MS bar reinforcement, MS grill work, cables, PVC end caps, CI steps, paint, sand, aggregates.

Reuse of these waste products can be realized by a combined effort among waste management, nature of source, reserve, environmental protection and highway construction agencies. Managing the waste from its generation to recycling process to the further reuse or decision to landfill it comes under C&D waste management. This has various methods to be handled with respect to the cases.

Most common strategy that is being used for waste management follows the methods of reducing, reusing and recycling.

- **Reduce:** Reducing waste during a construction project involves careful planning. Construction materials come in standard sizes, so design our project with these dimensions in mind, it can greatly cut down on excess that gets thrown away.
- **Reuse:** Reusing waste may be the most important part of the cycle, because this is where we have the most opportunities to assuage our green conscience.
- **Recycle:** Recycling waste is the last of three R's, because it is the least desirable for several reasons. Not all materials can be recycled but of course, recycling is preferable to using landfills. Roof shingles can be recycled into asphalt pavement, dry wall scraps can be recycled into textured wall sprays, agricultural products.

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