

Shape Makes Building Greener

(Green Building – Circular Building)

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Abstract: There are lot of green building concept have been evolved in last two decades in various fields. But all type of green building materials is much costlier than currently available material. Not only the material is costly when compare with the traditional building material, but also the quantity of the material used for construction is not reduced much while using the contemporary building material. To solve out this problem circular building technique is need to be adopted.

Index Terms - Green Building, Circular Building, Shape of Building.

I. INTRODUCTION

Since from the starting of global warming issues, in construction industry there are lot of new invention came to effective adaptation in construction. Construction industry was one of the major reasons for global warming issues. There are lot of material which have been already introduced in construction to reduced global warming. Even though all materials are helps in reduction of global warming but the cost of material and quantity of material is not reduced. And some of the material is much difficult for production, making and assembling it. The current view for making green construction is concentrated only on changing the conventional material and using green materials only. But there is also another way to make a building as greener, by taking advantage on the shape of the building with even using any conventional material.

II. SHAPE OF BUILDING

While selecting the shape of building much concern should be given, because shape of building can have much importance in ventilation, lighting effect and material consumption. Every shape will not have same effects on building. Every shape has its own unique effects on building some shape will consume much material for construction and some will consume less materials, some shape needs more artificial ventilation and some will have much natural ventilation. Like that some shape will reduce use of artificial lighting because it will have sufficient natural lighting.

III. MATERIAL CONSUMPTION

Material consumption is directly connected to the cost of the structure. In material consumption where not reduced in any green building concepts. Because it deals with the volume of materials, material consumption can't be reduced without reduction in volume or can be reduced by using air entrained concrete. But shape of building can help us in reduction of materials. Each shape has its own circumferential length to cover a same area. Let's check this strategy in rectangle, square and circle shapes.

Table.1: Shape Details

	<i>Rectangle</i>	<i>Square</i>	<i>Circle</i>
Area	50.00 m ²	49.999 m ²	50.00 m ²
Length/Dia	8.000 m	7.071 m	7.979 m
Breath	6.250 m	7.071 m	-

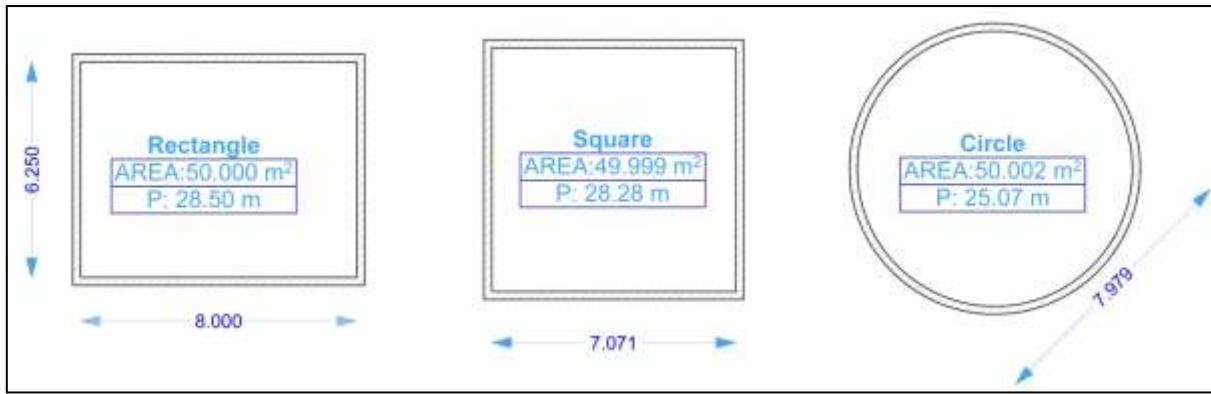


Fig.1: Details of Shapes

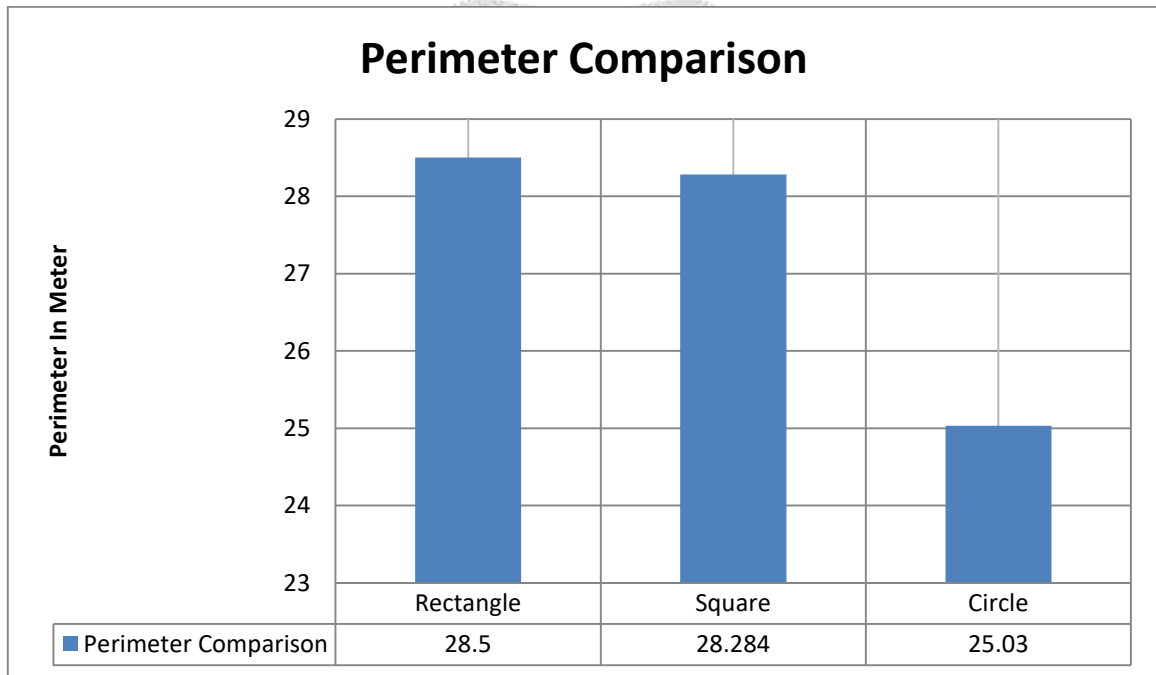


Chart.1: Perimeter Comparison Graph

Here graph will clearly state that the material required for constructing the same area in rectangle, square and circle will vary according to its unique shape. And also we can see that both rectangle and square building will have at most merely same perimeter length. The difference in perimeter length of rectangle and square is just 1% variance. But for same area cover circular area have great difference. The difference in perimeter between the rectangle and circle shape of building will be in 12% variance. This length of wall will reduce the material consumption while constructing building in circular area.

IV. PERIMETER DIFFERENCE STUDY

In this study, various areas have taken for study purpose and for that area; 'Length, Breadth and Diameter' are calculated. For that shape perimeter is determined and the perimeter difference is calculated.

Table.2: Measurement and Perimeter Details

S. No	Area Sq.M	Square			Rectangle			Circle		Difference b/w C&S in M
		Leng th (M)	Breat h (M)	Perimeter, S (M)	Leng th (M)	Breat h (M)	Perimeter, R (M)	Dia (M)	Perimet er,C (M)	
1	50	7.07	7.07	28.28	8.00	6.25	28.50	7.97	25.03	3.25
2	52	7.21	7.21	28.84	8.16	6.37	29.06	8.13	25.53	3.31

3	54	7.35	7.35	29.39	8.31	6.50	29.62	8.28	26.02	3.38
4	56	7.48	7.48	29.93	8.47	6.61	30.16	8.43	26.49	3.44
5	58	7.62	7.62	30.46	8.62	6.73	30.70	8.58	26.96	3.50
6	60	7.75	7.75	30.98	8.76	6.85	31.22	8.73	27.42	3.56
7	62	7.87	7.87	31.50	8.91	6.96	31.74	8.87	27.88	3.62
8	64	8.00	8.00	32.00	9.05	7.07	32.24	9.02	28.32	3.68
9	66	8.12	8.12	32.50	9.19	7.18	32.74	9.16	28.76	3.73
10	68	8.25	8.25	32.98	9.33	7.29	33.24	9.29	29.19	3.79
11	70	8.37	8.37	33.47	9.47	7.40	33.72	9.43	29.62	3.85
12	72	8.49	8.49	33.94	9.60	7.50	34.20	9.56	30.04	3.90
13	74	8.60	8.60	34.41	9.73	7.60	34.67	9.69	30.46	3.95
14	76	8.72	8.72	34.87	9.86	7.71	35.14	9.82	30.86	4.01
15	78	8.83	8.83	35.33	9.99	7.81	35.60	9.95	31.27	4.06
16	80	8.94	8.94	35.78	10.12	7.91	36.05	10.08	31.67	4.11
17	82	9.06	9.06	36.22	10.24	8.00	36.50	10.20	32.06	4.16
18	84	9.17	9.17	36.66	10.37	8.10	36.94	10.33	32.45	4.21
19	86	9.27	9.27	37.09	10.49	8.20	37.38	10.45	32.83	4.26
20	88	9.38	9.38	37.52	10.61	8.29	37.81	10.57	33.21	4.31

From the above the table we can find the standard difference for the particular shape which is compared. As per our study circle will has lowest perimeter and after that square have lowest perimeter. And then in last rectangle will have highest perimeter. According to this when a building is constructed in circle shape it will consume much less material.

V. VENTILATIONSTUDY

It is found that the ventilation provided in any edged building (Square or Rectangle) will need more than one number of windows or ventilators which indirectly again acquire more building material. But in curved shaped building especially in circular shape building providing a single window or ventilator is enough to receive such a good quantity of wind and air when compared to the edged building.

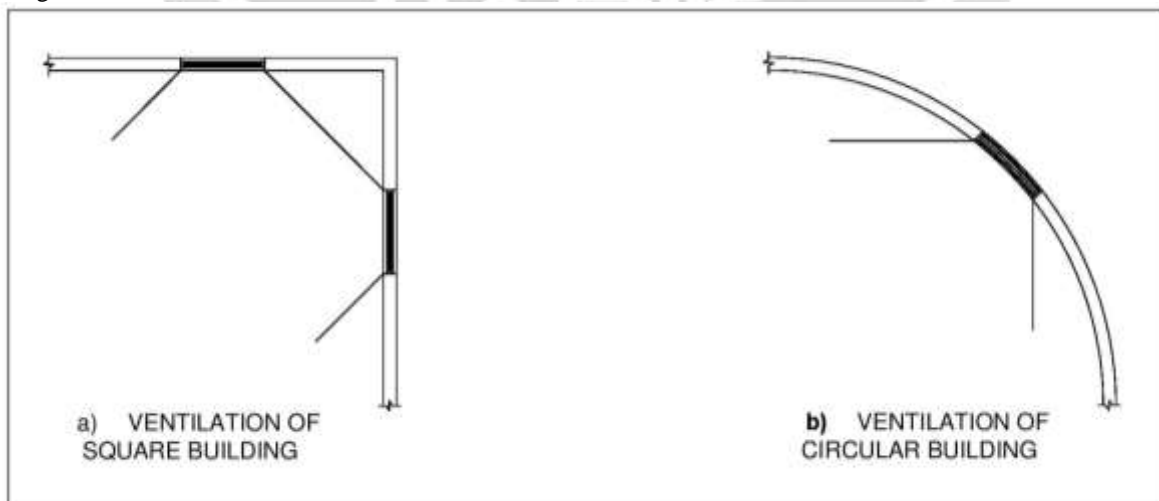


Fig. 2: Ventilation Study

In general, circular building will have good air flow inside the building, due to its curved shaped. Thus this will reduce usage of fans and air conditioners, reduction in usage of fans and air conditioners will make the building to use less energy consumption.

VI. CONCLUSION

Now it will be very clear that the shape of building plays a vital role in construction technology. And also by adopting the circular shape, consumption of the material incurred for the construction of a building will be reduced up to 12%, This will make engineers to provide building at less cost and even greener building to the society. By adopting this method of green concept engineers can help in reduction of the greenhouse effects.

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