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SVAGRIHA RATING SYSTEM FOR SMALL SCALE BUILDING

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Abstract: Rise of urban population for developing countries like India increases the demand for housing further adding stress on limited resources causing an undesirable impact on the environment. Study shows that the demand for residential construction and linked infrastructure including resources is always high. A strong need to reduce these impacts has risen due to its bad global effects and sustainability approach seems to be an only solution to counteract it. So, to minimize these negative impacts to environment and increase resource efficiency of this small-scale building foot prints, GRIHA (Green Rating for Integrated Habitat Assessment) council has made a design-cum-rating tool called SVAGRIHA (Simple Versatile Affordable GRIHA). This paper purposes to analyze viability of SVAGRIHA norms and give green rating as same. Recommendation of practical application of each criterion is considered.

Index Terms **- Green building, SVAGRIHA, GRIHA.**

I. INTRODUCTION

A 'green' building is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life. There are a number of features which can make a building 'green'. These include: Efficient use of energy, water and other resources, use of renewable energy, such as solar energy, Pollution and waste reduction measures, and the enabling of re-use and recycling, Consideration of the environment in design, construction and operation, Consideration of the quality of life of occupants in design, construction and operation, etc. Most of the local construction is having smaller building foot prints. In order to reduce the impact on resources, we need to focus on base level construction. SVAGRIHA is developed in such a way that it minimizes resource demand and environmental impacts for smaller buildings. SVAGRIHA gives flexibility to project so that can accomplish maximum rating without losing comfort.

For a given study, we selected the site location at Ambarnath region. This region is one of the fastest growing cities in Mumbai metropolitan. In Ambarnath, most of the RCC construction is mainly used for residential purpose. Due to smaller building foot-print of given project, SVAGRIHA is applicable.

II. SVAGRIHA (SIMPLE VERSATILE AFFORDABLE GREEN RATING INTEGRATED HABITAT ASSESSMENT)

SVAGRIHA has been jointly developed by GRIHA, jointly by TERI (The Energy and Research Institute) and MNRE (Ministry of New and Renewable Energy) and ADaRSH (Association for Development and Research of Sustainable Habitats). SVAGRIHA is a simple, fast, easy and much affordable rating system and design tool. SVAGRIHA mainly focuses on small-scale buildings which has quick development and high-density occupation instead of large-scale developments. SVAGRIHA is rating and design tool for small-scale developments having built-up area less than 2500 sq.m.

SVAGRIHA rating system having a total 14 criterion with maximum 50 points & minimum points is 25 to certified building as green building. The rating will be given in the range of 1-5 star, as per the gained points & maximum criterion has been fulfilled the star rating is given to building by SVAGRIHA. The criterion is sub divided in five groups that is landscape, architecture & energy, water & waste, materials and lifestyle. The rating is small, easy, affordable, convenient & smart for all smaller construction in India.

Table 2.1: Criterion Points distribution in SVAGRIHA

Criterion No.	Criterion Name	Points
1	Reduce exposed, hard paved surface on site and maintain native vegetation cover on site	6
2	Passive architectural design and systems	4
3	Good fenestration design for reducing direct heat gain and glare while maximizing daylight penetration	6
4	Efficient artificial lighting system	2
5	Thermal efficiency of building envelope	2
6	Use of energy efficient appliances	3
7	Use of renewable energy on site	4
8	Reduction in building and landscape water demand	5
9	Rainwater harvesting	4
10	Generate resource from waste	2
11	Reduce embodied energy of building	4
12	Use of low-energy materials in interiors	4
13	Adoption of green lifestyle	4
14	Innovation	2
Total		50

In order to get a rating, it is obligatory for each project to accomplish a certain number of minimum points in each category as stated below.

Table 2.2: Classification of rating in SVAGRIHA

Sub group	Maximum points	Minimum points to be achieved
Landscape	6	3
Architecture & Energy	21	11
Water & Waste	11	6
Materials	8	4
Lifestyle	4	1

Table 2.3: SVAGRIHA Star Rating

Points achieved	SVAGRIHA Rating
25-29	*
30-34	**
35-39	***
40-44	****
45-50	*****

III. SVAGRIHA CRITERION FOR BUILDING

3.1 Project details:

- Project name: Anand Co-op Housing Society
- Location: Ambarnath, Dist: Thane.
- Name of builder: Royal Builder & Developers.
- Total Build-up area: 1700 sq. m
- Status: Under construction

The proposed under construction project is G+4 residential building with the provision of basement. The building is RERA approved project added with earthquake resistance R.C.C structure, attractive elevation, French windows, rainwater harvesting system, solar system, 24×7 surveillance camera, video door phone, sitting area for senior citizen, stilt and open parking and many more services. Ground floor is specially allocated for commercial activities and parking purpose.

3.2 Feasibility of criterion

The SVAGRIHA criterions are followed in three stages of construction i.e., before, during and after construction. Feasibility of norms is important to identify the criteria's which may followed or implement before and during construction. The following feasibility gives direction to project with respect to rating system & one can simply analyze each criterion and give proposition on it. Feasibility will show maximum attainable points for green rating certification.

Table 3.1: Criterion Points achieved in SVAGRIHA

Criterion No.	Criterion Name	Points	Points Achieved
1	Reduce exposed, hard paved surface on site and maintain native vegetation cover on site	6	6
2	Passive architectural design and systems	4	3
3	Good fenestration design for reducing direct heat gain and glare while maximizing daylight penetration	6	5

4	Efficient artificial lighting system	2	2
5	Thermal efficiency of building envelope	2	0
6	Use of energy efficient appliances	3	2
7	Use of renewable energy on site	4	3
8	Reduction in building and landscape water demand	5	4
9	Rainwater harvesting	4	4
10	Generate resource from waste	2	2
11	Reduce embodied energy of building	4	2
12	Use of low-energy materials in interiors	4	2
13	Adoption of green lifestyle	4	4
14	Innovation	2	2
Total		50	41

From the above table, the given project achieved 41 points out of 50. According to this result points is in between 40-45, so the project will be rated as a 4-star rating as per the SVAGRIHA certification.

IV. RECOMMENDATION FOR SITE

For practical implementation of each criterion recommendations and comments have given to the building, so that maximum points can be achieve for achieving the 5-star rating.

Table 4.1: Recommendations

Criterion No.	Observation	Points Achieved
1	It is observed from site area calculation that more than 70% area is grass paved & under shade.	3
	According to site area 9 tress will be planted and it should be native	3
2	Adopt passive strategies like green roof, orientation of building as per wind flow	2
	Adopt active low energy cooling system like desert coolers, etc.	1
3	Fenestration design has been done such that overall insolation reduces by 50% over the base case	3
	More than 75% of the daylight are falls under a daylight zone	2
4	Overall LPD of the building is come out around 7 W/sq.m. which is less than ECBC recommendable LPD level.	2
5	The thermal efficiency of the building envelope meets not the threshold as prescribed in SVAGRIHA	0
6	Provide all energy efficient applications with 4-star BEE labelled	2
7	Provide 3 kW solar panel	2
	Provide solar heater system which will produce hot water of 1000 lit/day.	1
8	Reduce the total water requirement in the building by 60% by using Water Closets	2
	Reduce the landscape water demand by planting native trees and water supply by using drip irrigation	2
9	Along with the recharge pit project, need to provide minimum 14,500 lit of rain water harvesting tank	4
10	Convert organic waste into compost by using vermicomposting technology	2
11	During construction, it is observed that 100% PPC is replaced by Ordinary Portland Cement	2
12	More than 50% of in-build furniture/panel & frames/ false ceiling is low energy	1
	All interior is painted low-VOC white and lead-free paints	1
13	According to location features, 8 basic amenities are easily available and reachable.	2
	One common dedicated toilet is provided for non-residential people	2
14	Suggestions: 1) Reduction in finishing materials by using gypsum. 2) Use neem-based fertilizer 3) Smoking to be banned from all common areas	2

Table 4.2: Points achieved as per the classification of rating in SVAGRIHA

Sub group	Maximum points	Minimum points to be achieved	Points Achieved
Landscape	6	3	6
Architecture & Energy	21	11	17
Water & Waste	11	6	9
Materials	8	4	5
Lifestyle	4	1	4

V. RESULT

By providing above recommendations 41 points can be achieve for project building and also, the necessary minimum points required as per the classification of rating in SVAGRIHA can be achieved. Therefore, project will get 4-star (****) SVAGRIHA rating.

VI. CONCLUSION

The systems recommended for the building if installed will help building to reduce 30-50% in operational cost, 50-70% energy consumption and more than 40% water consumption. It shows that most of the building which adopted SVAGRIHA will conveniently maintained resource efficiency, energy consumption, protecting human health and improving productivity over a large period of time. The aim of this research is to represent the green building as a sustainable building for tomorrow as this system includes the eco-construction criterion, proper energy and least waste & water consumption. Though the investment is much but the benefits by the both systems is quite more in terms of all economic, social and environmental. Thus, green building plays the remarkable role in making our globe pollution free and to make it greener.

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