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GREEN RATINGS OF BUILDINGS, SURVEY AND ANALYSIS

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ABSTRACT:

This paper contains survey and analysis of green criteria's of different building in Kolhapur. From building site visits it is observed that the knowledge and application of green building concepts in Kolhapur region is far lacking behind. There is need to organize awareness program on green building concepts and its application for both the general public and to site engineers and builders. By using the concept of Green Rating for Integrated Habitat Assessment (GRIHA) awareness of green building can be increased.

KEYWORDS: Green building; GRIHA.

I. INTRODUCTION:

Green Building is assimilation of environment friendly and resource efficient processes at each stage of construction, starting from site selection and designing to construction, operation followed by maintenance, renovation or even Retrofitting. The endeavor is to achieve minimum effect on environment.

What is a green building?

Buildings have big environmental impact during their life. Resources such as ground cover, forests, water, and energy are decreasing to give way to buildings. Resource-intensive materials gives structure to a building and landscaping adjoins beauty to it, in turn using up water and pesticides to maintain it. Energy-consuming systems for lighting, air conditioning, and water heating provide comfort to its occupants. Hi-tech controls add intelligence to 'inanimate' buildings so that they can respond to changing conditions, and intelligently monitor and control resource use, security, and usage of firefighting systems and other such systems in the building. Water, another very important resource for the residents, gets consumed continuously during building construction and operation. Many building processes and occupant functions generate enormous amounts of waste, which can be recycled or reused directly. Buildings are thus one of the major pollutants that affect urban air quality and contribute to climate change. Hence, there is need of design a green building, the attributes of which is to address all these issues in scientific and an integrated manner. It is a known fact that it costs more to design and construct a green building compared to other buildings.

The Green Building concept focuses mainly on two points:

•Increasing the efficiency of buildings by using energy, water and materials.

•Reducing building effects on human health and the environment, through better design, site selection, construction, operation & maintenance, and removal throughout the complete life cycle.

What is green building rating system?

For measuring environmental performance of a building through its life cycle, a green building rating system is a calculation tool. It contents of a set of criteria which includes different parameters related to design, construction and operation of a green building. performances benchmarks and goals which are largely quantifiable are mentioned in ach criterion which has pre-assigned sets and points. If project fulfills the rating criteria it is awarded by points. Final rating of a project is decided by adding points from start to end. For a fair evaluation of project rating systems call for independent third party and different processes are put in place. Globally, green building rating systems are largely compelled in nature and have been tool in raising awareness and popularizing green building designs.

Some of the successful international rating programmes are:-

1. **GRIHA-** Green Rating For Integrated Habitat Assessment
2. **LEED-** Leadership in Energy and Environmental Design.
3. **BREEAM-** Building Research Establishment's Environmental Assessment Method.
4. **CASBEE-** Comprehensive Assessment System for Building Environmental Efficiency.
5. **HK–BEAM-** The Hong Kong Building Environmental Assessment Method.
6. **RETREAT-** Resource Efficient TERI Retreat for Environmental Awareness and Training.
7. **IGBC-**Indian Green Building Council

OBJECTIVES:

A. To find the status of application of green building concepts in Kolhapur.
B. To compare buildings in Kolhapur according to green building rating criteria's.

C. To create awareness to the general public and to the concern interested builders, about the standard of the application of green building concepts in Kolhapur region at present.

II. METHODOLOGY:

1. STUDY LITERATURE: In this phase different papers were referred about green building and their ratings.

2. COMPARE RATING SYSTEMS: Different the green building rating systems were compared.

3. CHOOSE OF RATING SYSTEM: Appropriate green building rating system is chosen for the project in this phase.

4. PREPARING LIST OF SITES: Different ongoing and recently completed projects (15 sites) are chosen for the project.

5. SITE VISIT SURVEY AND GREEN BUILDING CRITERIA WISE DATA COLLECTION: In this phase site visit and survey to all the sites is done and data is collected observing and questionnaire according to chosen green building rating system.

6. ANALYSATION OF DATA AND RATING SHEET: In this phase data collected from different sites is analyzed and rating sheet for all the building is prepared according to green building rating system.

7. COMPARISION OF SITES: In this phase rating sheets of all sites is compared obtaining the result of the project.

III. LITERATURE REVIEW:

1. GRIHA MANUAL VOLUME-I, APOORVVIJ (2010) GRIHA MANUAL:

GRIHA MANUAL is a Green Building rating assessment Program Published by a group of TERI technical Team in India in 2010. They have given some of the successful international ratings programmes like BREEAM (building research establishment environmental assessment method), LEED (leadership in energy and environmental design), TERI (the energy and resources institute), and GRIHA (green rating integrated habitat assessment). After a proper study and understanding of the current internationally accepted green building rating system and prevailing building practices in India, GRIHA was developed by TERI as the national green building rating system in India.

In this manual they have given the guide lines and steps to be followed for evaluation and rating of the buildings. According to GRIHA, a building is rate based on thirty four criteria's. Each criteria have different points. A building requires a minimum of 50 points to get the building rated as green building.

They have taken up a case study of GRIHA registered/rated buildings in which case studies of Common Wealth Games Village, New Delhi, Suzlon One Earth are included.[1]

2. TERI–GRIHA (TERI–GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT):

In this manual the criteria for green building rating have been categorized as follows. Site planning, Building planning and construction, Building operation and maintenance and Bonus points. The site planning is further subdivided in two categories viz. Resource conservation and efficient utilization of resources and Health and well-being. Building planning and construction also subdivided in three categories viz. Recycle, reuse, and recharge of water, Waste management and Health and well-being. They have given all thirty four criteria in detail, in which site planning covers first eight criteria, Under Building planning and construction section there are twenty one criteria, Building operation and maintenance contains two criteria and remaining three criteria are bonus points.[5]

3. CHOOSING THE RIGHT GREEN BUILDING RATING SYSTEM, MICHAEL DRIEDGER (PERKINS WILL RESEARCH JOURNAL 2009):

This paper focuses on a technical guidlines that was purposeful to provide the University of British Columbia's (UBC) Sustainability Office with a potential strategy to move the Point Grey Campus to carbon neutrality without the purchase of carbon offsets by 2030 and to recommend a green building rating system that would form part of this strategy. The paper will focus on the analysis of the following green building rating systems and how they measure energy and carbon. • BOMA Go Green (Canada and the US) • BREEAM (UK) • Green Star (Australia) • Passive House (Germany and the US) • The Living Building Challenge (Canada and the US) • LEED® (Canada and the US) The paper will look at available rating systems for new and existing buildings, but will not cover single family residential rating systems.[4]

4. NATIONAL GREEN RATING SYSTEM – GRIHA, TERI (THE ENERGY AND RESOURCE INSTITUTE), 2008:

This report has given history of GRIHA formation, introducing to TERI, role of TERI in recognizing environment-friendly initiatives, what is a green building, how to get your building rated, GRIHA evaluation process, synopsis of the criteria for rating, detailed scoring points for GRIHA, evaluation procedure of criterion of GRIHA and detailed description of criteria's of GRIHA are explained.

5. GREEN BUILDINGS, WEEA (WORLD ENERGY EFFICIENCY ASSOCIATION), DEBAJIT PALIT: THE ENERGY AND RESOURCES INSTITUTE (TERI):

Paper has introduced to how do we create energy efficient buildings?, notes on basic energy sources in an eco-friendly building complex, passive solar design interventions, energy efficiency, use of renewable energy technologies, low energy materials and methods for

building construction, energy efficient buildings in India, limitations of solar passive building design and mainly paper has emphasized need for awareness and use green building.[2]

IV. PREPARING LIST OF SITES:

According to survey different available sites in Kolhapur city were listed and 15 sites were selected. Following is list of different sites:-

Site No.	Name	Builders
1	Lake Woods	Shivdatta Associates
2	Hira Shree	Shree Builders And Developers
3	Punya Parva	Ramsina Group
4	Aim Platinium	Bhima Builders
5	Royal Astonia	Suraj Estate Develpoers
6	Ekant	Landscape Contruction
7	Wonder 11	Pooja Builders And Developers
8	Evergreen Homes	Ghatge Developments.
9	Prestige	Bhima Builders
10	Acacia	Jotiraditya Estate Developers
11	Pride	Unity Builders And Developers
12	Life Style	Bhima Builders
13	Kalika Puram	Potdar Construction
14	Shriram Heights	Shriram Builders And Developers
15	Suncity	Shivdatta Associates

V. ANALYSIS OF DATA AND RATING SHEET:

A. GRIHA:

Site Selection and Site Planning, Conservation and Efficient Utilization of Resources, Building Operation and Maintenance, and Innovation points are various sections under 34 criteria's of GRIHA rating system.

Out of these 34 criteria are eight criteria's are mandatory, four criteria's are partly mandatory and remaining are optional. Number of points is assigned to each criterion. It shows that purpose of the project to meet the criterion which would qualify for the points. On the number of points earned different levels of certification (one star to five stars) are awarded. The minimum points required for certification is 50.

B. ELIGIBILITY

For certification under GRIHA buildings more than 2,500 sq. m, (except for industrial complexes) and which are in the design stage are eligible. Buildings include: offices, retail spaces, institutional buildings, hotels, hospital buildings, healthcare facilities, residences, and multi-family high-rise buildings.

C. WEIGHTAGE OF CRITERIA'S:

GRIHA is a performance-oriented and guiding system where points are earned for meeting the design and performance intent of the criteria. Number of points assigned to each criterion.

Compliances, as specified in the relevant criterion, have to be submitted in the prescribed format. While the intent of some of the criteria is self-validating in nature, there are others such as energy consumption, thermal and visual comfort, noise control, and indoor pollution levels which need to be validated on-site through performance monitoring. The points related to these criteria (specified under the relevant sections) are awarded provisionally while certifying and are converted into firm points through monitoring, validation, and documents/photographs to support the award of point.

GRIHA is a 100 point system consisting of some core points, which are mandatory, while the rest are optional. [1]

TABLE I. DIFFERENT LEVELS OF CERTIFICATION

Points achieved	GRIHA Rating
50-60	*
61-70	**
71-80	***
81-90	****
91-100	*****

TABLE II. RATING SHEET FOR SITE NO. 2

Sr.No.	Criteria	Points allotted	Points Scored
1	Site Selection	1	1
2	Preserve and Protect landscape	5	2
3	Soil conservation (post construction)	2	1
4	Design to include existing site feature	4	0
5	Reduce hard paving on site	2	1
6	Enhance outdoor lighting system efficiency and use RE system for meeting outdoor lighting requirement	3	1.7
7	Plan utilities efficiently and optimize on site circulation efficiency	3	1
8	Provide, at least, minimum level of sanitation/safety facilities for construction workers	2	2
9	Reduce air pollution during construction	2	0
10	Reduce landscape water requirement	3	0
11	Reduce building water use	2	1
12	Efficient water use during construction	1	0
13	Optimize building design to reduce conventional energy demand	6	0
14	Optimize energy performance of building within specified comfort	12	4
15	Utilization of fly ash in building structure	6	0

Sr.No.	Criteria	Points allotted	Points Scored
16	Reduce volume, weight and time of construction by adopting efficient technology (e.g. pre-cast systems, ready-mix concrete, etc.)	4	2
17	Use low-energy material in interiors	4	1
18	Renewable energy utilization	5	0
19	Renewable energy based hot water system	3	2
20	Waste water treatment	2	0
21	Water re-cycle and re-use (including rainwater)	5	5
22	Reduction in waste during construction	2	2
23	Efficient waste segregation	1	0
24	Storage and disposal of waste	2	0
25	Resource recovery from waste	2	2
26	Use of low VOC paints/ adhesives/ sealants.	4	0
27	Minimize Ozone depleting substances	3	0
28	Ensure water quality	2	0
29	Acceptable outdoor and indoor noise levels	2	0
30	Tobacco and smoke control	1	0
31	Universal Accessibility	1	1
32	Energy audit and validation	0	0
33	Operations and Maintenance protocol for electrical and mechanical equipment	2	0
34	Innovation	4	0
	Total Points	104	29.7

VI. RESULT:

TABLE III. COMPARING RATING SHEET FOR ALL SITES

Criteria	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
1	1	1	1	1	1	1	1	1
2	2	2	1	3	2	2	0	1
3	4	1	4	0	2	0	0	0
4	0	0	0	2	0	0	0	0
5	0	1	2	0	0	1	0	0
6	1.8	1.7	2	1.6	0.7	1.8	1.7	0.9
7	1	1	2	1	1	0	0	0
8	1	2	2	1	1	2	2	2
9	2	0	2	2	0	0	0	0
10	0	0	2	0	0	0	0	0
11	1	1	1	1	1	1	1	1
12	1	0	1	1	0	1	1	1
13	0	0	0	0	0	0	0	0
14	2	4	8	6	8	2	4	0
15	0	0	6	0	0	0	0	0
16	1	2	0	0	0	0	0	0
17	1	1	1	2	0	2	0	0
18	0	0	0	0	0	0	1	2
19	2	2	3	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	5	5	5	2	0	3	0	5
22	0	2	0	0	0	0	0	0
23	2	0	2	2	2	1	0	0
24	2	0	2	2	0	2	2	1
25	0	2	0	0	0	0	0	0
26	2	0	2	2	2	2	0	1
27	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	0	1	1	0	1	0	1	0
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
TOTAL	31.8	29.7	50	29.6	21.7	21.8	14.7	15.9

Criteria	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
1	1	1	0	0	0	1	1
2	2	2	0	2	0	1	1
3	0	0	0	2	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0.9	0.9	0.6	1.8	1.7	1.6	1.9
7	1	0	1	2	0	2	2
8	1	2	2	1	1	1	1
9	0	2	1	0	0	2	2
10	0	0	0	0	0	0	0
11	1	1	1	1	1	1	1
12	1	0	0	1	0	1	1
13	0	0	0	0	0	0	0
14	0	0	2	6	4	6	6
15	0	0	0	0	0	0	0
16	2	0	0	0	0	0	0
17	0	0	0	2	0	2	2
18	0	0	0	0	0	0	0
19	1	1	2	2	0	1	1
20	0	0	0	0	0	0	0
21	5	5	2	5	3	5	5
22	0	1	0	0	0	0	0
23	0	2	0	2	2	0	0
24	0	1	2	2	2	2	2
25	0	0	0	0	0	0	0
26	2	2	1	2	2	2	2
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0
TOTAL	17.9	21.9	14.6	31.8	16.7	28.6	28.9

TABLE IV. COMPARING GRIHA RATING

Site No.	Name	Griha Rating
1	Lake Woods	-
2	Hira Shree	*
3	Punya Parva	-
4	Aim Platinium	-
5	Royal Astonia	-
6	Ekant	-
7	Wonder 11	-
8	Evergreen Homes	-
9	Prestige	-
10	Acacia	-
11	Pride	-
12	Life Style	-
13	Kalika Puram	-
14	Shriram Heights	-
15	Suncity	-

VII. CONCLUSION:

I have studied fifteen different buildings in Kolhapur. We have collected all the possible data that is available from all the sites and analysis them carefully based on the criteria set by GRIHA (green rating integrated habitat assessment). We have found out that out of 15 buildings only one building have scored points more than 50, which is the minimum points required to rate a building.

During our site sites, we found that many of the site engineers were not aware of or applying the green building concepts at site, which otherwise is very important concepts to save energy and to protect the natural environment. It was hard to fine that some of the site engineers are even reluctant to share the data with us, which we needed it for the analysis.

From all this site experiences we got from site visit and the analysis of all those data collected from sites, we came to know that the knowledge and application of green building concepts in our Kolhapur region is far lacking behind. Therefore it is necessary to organize awareness program on green building concepts and its application for both the general public and to site engineers and builders. If this kind of small measures taken today, tomorrow Kolhapur will become a 100 percent green city.

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