

ENVIRONMENT AUDIT

STUDY PERIOD (TWO YEARS) 2021 – 2022 & 2022 - 2023

Sustainability study

AUDIT REPORT

Studied for

Bombay Suburban Art and Craft Education Society's

L. S. Raheja

School of Architecture

Raheja Education Complex, Plot no. 341,

Kher Nagar, Bandra East,

Mumbai – 4000051

Studied in the capacity of

Accredited and Certified

Green Building Professional



Studied by

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Disclaimer

The Audit Team has prepared this report for the **Bombay Suburban Art and Craft Education Society's L. S. Raheja School of Architecture** located at Raheja Education Complex, Plot no. 341, Kher Nagar, Bandra East, Mumbai – 4000051 based on input data submitted by the Institute analysed by the team to the best of their abilities.

The details have been consolidated and thoroughly studied as per the various guidelines for Green Buildings available in National and International Standards; the report has been generated based on comparative analysis of the existing facilities and the prerequisites formulated by various standards. The inputs derived are a result of the inspection and research. These will further enhance and develop a Healthy and Sustainable Institution.

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Developing Healthy and Sustainable Environments

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Acknowledgement

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Our special thanks are extended to everyone from the Management.

Our heartfelt thanks are extended to the Chairperson of the entire process **Ar. Principal Mandar Parab**, (Principal and Member Secretary).

We are also thankful to Institute's Task force who have played a major role in data collection.

- Faculty members – **Ar. Uttara Nalawade, Ar. Meghana Patil, Ar. Charvi Kamat and Ms. Bhakti Sawant**
- Non-teaching staff members – **Mr. Avinash Dhabade and Mr. Sachin Pitale**
- Admin staff members – **Ms. Jyoti Parab, Mr. Prashant Maingade, Mr. Ghanshyam Khanal and Mr. Ashish**

We appreciate the cooperation of the **entire Teaching, Non-teaching, and Admin staff** for their support while collecting the data.

Sustainable Academe

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1. Introduction

1.1 About the Institute

The Institute aims to be a renowned learning community engaged in exemplary teaching and research; by creating entrepreneurs who have been trained in understanding design as a broad humanistic and scientific discipline with technical skills complemented by personal vision and ethical perception.

The Mission of the Institute includes - To create a dynamic institution of learners through creative and critical thinking and dedication to high standards; To produce leaders that meet the demand of a globally challenging profession through sound training; To prepare students to evolve with the ever changing world by offering comprehensive, high quality programs and services that respond to the need of the industry; To strive for excellence and foster the spirit of professionalism by creating a culture of constant improvement through measuring learning across the institution and To support diversity thereby adopting a holistic approach through the process of lifelong learning.

1.2 Assessment of the Institute

1.2.1 Affiliation

The courses provided by the Institute received affiliation through the **University of Mumbai**, a public state university in Mumbai, Maharashtra.

1.2.2 Certification

The Institute has received the code under **All India Survey of Higher Education (AISHE)** wherein the code is C-33788.

1.2.3 Approval

The courses by the Institute have received approval through

- **Council of Architecture (COA), New Delhi**
- **Directorate of Technical Education, Maharashtra**
- **University Grants Commission (UGC) (2f), New Delhi**

2. Overview

2.1 Summarised Populace analysis for 2022-2023

2.1.1 Students data

The data (shared by the Institute) shows there were **367 students**.

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	07	05	12
2	Teaching staff	20	15	35
3	Non-Teaching staff	09	01	10
Total Staff Members		36	21	57

Table 1: Staff data of the Institution for 2022-2023

The staff data shows the Institute premises had **57 Staff Members**.

2.2 Summarised Populace analysis for 2021-2022

2.2.1 Students data

The data (shared by the Institute) shows there were **361 students**.

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	07	06	13
2	Teaching staff	19	17	36
3	Non-Teaching staff	09	01	10
Total Staff Members		35	24	59

Table 2: Staff data of the Institution for 2021-2022

The staff data shows the Institute premises had **59 Staff Members**.

The numbers given above are all core full time faculty

3. Research

3.1 Institute Infrastructure

3.1.1 Establishment

The Institute was established on **1959**

3.1.2 Spatial Organisation

The infrastructure facilities of the campus include:

RESOURCES:

Learning Resources - The college boasts a grand, spacious and well planned campus. The Institute is centrally located and is easily accessible by all modes of public transport. We strive to provide a healthy, safe and encouraging, learning environment to all our students.

Studios - The premise has well lit and airy studio spaces. Studio spaces have independent working tables and storage facilities for each student. The walls of the studios are lined with vibrant soft boards for displaying students' work. The space is efficient and encourages students to use it flexibly and make it their own.

Lecture Halls - Each lecture hall has smart projector facilities and a public address system. This imparts flexibility in teaching and learning methods and encourages healthy interaction amongst faculty and students.

Library - The college library is a knowledge haven which enriches teaching, learning and research experience for the students and staff. It is well stocked with more than 6000 books, 350 e-books, several design magazines and E- journal subscription on varied subjects like Design, Graphics, Construction, Interiors, Landscape, Architectural Theories and several others. The Institute takes continual efforts to keep this compilation updated and maintained

Computer Lab - The Institute encourages students to envisage, develop and represent their ideas in innovative ways. To support this vision, the Computer lab has forty computers equipped with the latest design and visualization softwares.

Staffroom - The staffroom is a comfortable space for the faculty. It also accommodates cabins for the Principal and senior faculty. The Principal's cabin and staffroom are always open for students. Students can approach for additional guidance or any other concerns.

CO-CURRICULAR FACILITIES

Multipurpose Hall - A fully air conditioned multipurpose hall becomes an integral part of a student's journey in the institute, from Orientation day to the Convocation ceremony. This hall is aereate, well-furnished and fitted with a state of the art public address system, making it a perfect setting for several co-curricular and extracurricular events through the year

Seminar Hall - A hundred seater seminar hall is also available for various lectures and seminars conducted for the students throughout the year.

Material Bureau - Along with theoretical knowledge, to ensure a well-rounded education a material bureau has been set up. The Bureau has latest material samples, catalogues, application brochures and joinery prototypes. Being able to see materials upclose, gives students better visualization and understanding of all it's possible applications.

Surveying Lab - The surveying lab has equipment to train the students on various methods of land survey. These land surveys are used by students to create site drawings before design can begin.

Climatology Lab - The climatology lab is equipped with instruments to measure temperature, humidity, solar radiation, wind flow, wind direction, etc. This enables the students to understand the environmental factors and its impact on design.

Carpentry Workshop - The college has a wood and a metal workshop with necessary machines and tools. This gives an opportunity to students to explore various techniques, materials and also gain valuable hands-on experience.

Construction yard - The construction yard becomes the site of several creative endeavors and workshops. This space is used by students to create awe inspiring installations, life scale arches, creative wall bonds, prototypes of roofs, modifiable furniture and many more such interventions.

ALLIED FACILITIES

Canteen and Gym – The facility is provided to common to all shared campuses

Medical Assistance - The Institute cares for its students wellbeing. Along with basic first aid being available on campus, a general physician visits the institute every afternoon. The institute also has a psychologist visit once every week. Students who need assistance can make appointments and avail this free of charge facility.

Common rooms - The campus also has separate boys and girls common rooms, accessible to all students. This a space meant only for students. They use this space for group activities, co-curricular and extra-curricular participation, student council initiatives and many more.

Universal Access - The institute strives to provide its students universal access. The building is planned to give a barrier free access to all its spaces for physically challenged students. There is provision for ramps, elevators, wide lobbies and doors to ensure ease of movement. The driveway till the entrance of the institute allows access by all vehicles. This ensures easy approach and exit in case of any emergency.

Digital Campus - The entire campus has also been equipped with wireless internet access for its staff and students within the premises. This facilitates work and access to information wherever they are within the institute.

3.2 Operation and Maintenance of the premises

The interview session was held with the staff regarding the operation and working hours. The Institution is open from Monday to Saturday with the timings being 07:15 am to 19:00 hours.

4. Evidence



Plate 1: Discussion with the team and Principal of the Institute



Plate 2: Investigation of the fire & lie safety practices and internal spaces of campus



Plate 3: Discussion with the internal team about the facilities

5. Documentation

5.1 Open Spaces

There are no particular open spaces dedicated for sports or recreational purposes within periphery of the site. However, adjacent to the plot there is a public ground that provides an arena of green space.

5.2 Flora audit

A flora survey was carried out to identify the total numbers of plants and trees. The landscape area has a variety of plantations the details of the same are documented below.

S. No.	Plant name	Type	Nos.	Planted by
Outdoor plantations				
1	<i>Areca Palm</i>	Plant	20	Planted by staff
2	<i>Rhapis Palm</i>	Plant	24	Planted by staff
3	<i>Kentia Palm</i>	Plant	2	Planted by staff
4	<i>Dracaena</i>	Plant	3	Planted by staff
5	<i>Alpinea</i>	Plant	3	Planted by staff
6	<i>Schefflera</i>	Plant	3	Planted by staff
7	<i>Heliconia</i>	Plant	14	Planted by staff
8	<i>Good Luck Plants</i>	Plant	5	Planted by staff
9	<i>Snake Plants</i>	Plant	9	Planted by staff
10	<i>Song Of India</i>	Plant	2	Planted by staff
11	<i>Chaffa</i>	Plant	1	Planted by staff
12	<i>Green Dream</i>	Tree	6	Planted by staff
13	<i>Bamboo</i>	Tree	1	Planted by staff
14	<i>Ficus (Fig)</i>	Tree	27	Planted by staff
15	<i>Jaswand (Hibiscus Rosa-Sinensis)</i>	Plant	4	Planted by staff
16	Sadafuli (Catharanthus)	Plant	4	Planted by staff
Indoor plants				
17	<i>Snake Plant</i>	Shrub	4	Planted by staff
18	<i>Slipper Flower</i>	Shrub	1	Planted by staff
19	<i>Plilodendron</i>	Shrub	1	Planted by staff

20	<i>Dracenia</i>	Shrub	3	Planted by staff
21	<i>Spider Plant</i>	Shrub	14	Planted by staff
22	<i>Purple Heart</i>	Shrub	3	Planted by staff
23	<i>Jade</i>	Shrub	2	Planted by staff
24	<i>Adenium</i>	Shrub	1	Planted by staff
25	<i>Lasia Spinosa</i>	Shrub	1	Planted by staff
26	<i>Arrowhead Plant</i>	Shrub	1	Planted by staff
27	<i>Money Plants</i>	Shrub	5	Planted by staff
28	<i>Succulents</i>	Shrub	5	Planted by staff

Table 3: Details of the Flora in the premises

At present there are more than 169 numbers of plantations in the premises.

5.3 Fauna audit

The campus is located in an urban area with huge nos. of apartment blocks and concrete structures all over; the green cover is minimal and available only in the adjacent blocks. Thus, only general sparrows, crows are found in and around the campus as exceptional to certain exotic type of fauna species.

5.4 Noise Audit

Since the Institute is surrounded by an educational campus, multiple residential blocks and an open recreational ground the overall noise levels are quite low.

They do not have a direct negative impact on the day-to-day functioning and activities of the campus.

5.5 Carbon Footprint Audit

5.5.1 Eco-friendly Commuting Practices

- ➔ The campus is located with close proximity to:
 - Western express highway (City main road)
 - Bus stops
 - Railway station (Bandra)

- Thus, most of the stakeholders commute using public mode of transport keeping the carbon footprint is well under control.
- There are no major fossil fuels used inside the premises.

5.5.2 Heat Island Reduction

The positive aspects that help to keep the micro climate of the built-form under control are:

- Lights colored façade reflecting the harsh sunrays.
- Light colored walking pathway to keep the outdoor temperatures under control.
- Sufficient nos. of plantations around the periphery of campus.
- No use of any carbon emitting appliances.

The current measures taken are good enough and should be continued.

5.5.3 Outdoor Light Pollution Study

The Institute compound lights are not upward looking thus, these do not cause light pollution.

5.6 Fire Safety

Fire and life safety are an important consideration of the National Building Code 2016.

This aspect is touched upon as part of this study in the capacity of an Architect registered with the Council of Architecture. As part of the research, fire safety audit was considered from the 'Building systems' perspective. All provisions documented below:

- **Fire hose reel** – Near the appropriate duct areas
- **Fire extinguisher** – In spaces that have air conditioners
- **Fire sprinkler and alarm system** – This is available in the cellar areas as there is underground parking provision provided.
- **Fire hydrant cabinet** – This is available on every floor and Staircase mid-landing.

6. Suggestions

The following suggestions are section-wise recommendations and are supposed to be **executed within the next 2.5 years from the date of the Report submission**. The Institute can execute a plan after discussion with Project Head.

6.1 Site beautification

- ➔ **Bird house/ Feeders** - At appropriate locations there can be provisions for drinking water and some grains for birds as they visit the site much frequently.
- ➔ **Garden development** - *Scientific name plates and QR codes* – The team should undertake a project to have name plates with QR codes on every plant of the premises.

6.2 Heat island reduction

- ➔ **Cool rooftops** - The Terrace rooftops should be painted with Cooltop – reflective materials to reflect the harsh sun rays and reduce the heat absorption in the top most floor and surrounding areas of the building.

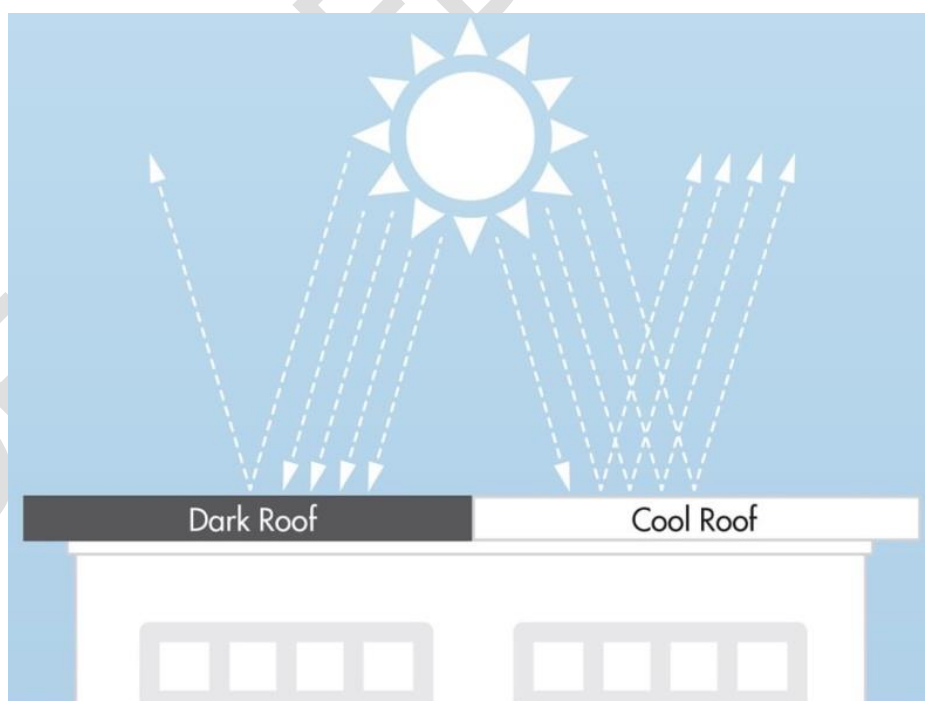


Plate 4: Cool roof comparative analysis (For reference purpose only)

Source: Image by <https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387>

- ➔ **Green wall** - The outdoor walls in areas could be modified as 'Green walls' to keep external temperatures under control. This is applicable based on the parameters of light, shade, wind, temperature, structural ability and rainfall. Know more <https://green-walls.co.uk/blog/5-key-considerations-when-designing-a-green-wall/>



Plate 5: Green roof (For reference purpose only)

Source: Image by <https://www.geoplastglobal.com/en/solutions/green/outdoor-green-wall/>

6.3 Life safety

- ➔ **Fire station** – A dedicated fire station could be established within the premises as part of the Fire and Life safety practices.
- ➔ **Mandate fire extinguisher in spaces** - One fire extinguisher should mandatorily be there in every space which has an air conditioner/ gas cylinder.
- ➔ **Sensitization programs** - Regular seminars/ webinars by experts such as Architects, Govt. Fire department on subjects related to fire and life safety should be organized and the outputs should be adopted and documented.

6.4 Pollution Control

- ➔ **Promote the use of Eco-friendly vehicles** - There can be student and staff sensitization program on eco-friendly and battery-operated vehicles/ low emission vehicles for daily use.

- ➔ **Battery charging points for Eco-friendly vehicles** - There can be provision for battery charge points, this would inspire students to change their mode of transportation and adopt sustainable practices.
- ➔ **Bicycles as a gift** - As an appreciation gesture maybe the student's toppers/ staff best performers can be awarded a bicycle occasionally.
- ➔ **Plant more radiation absorbing plants** - The following flora helps in reducing the harmful effects to a certain extent, the Institute can develop a radiation free zone and take to planting these through potted plants or permanent planting:
 - a. Spider plant
 - b. Rubber plant
 - c. Asparagus fern
 - d. Snake plant
 - e. Nelumbo nucifera (Includes colourful flowers)
 - f. Cactus
 - g. Areca palm
 - h. Mustard green
 - i. Betel
 - j. Aloe vera
 - k. Sprengers asparagus
 - l. Fiddle fig

7. Compilation

The study is based on the data collected, analyzed, rechecked, and confirmed through multiple modes. For the quality study, some standards/ notes have been referred to. These are listed and noted below. However, no direct references have been used anywhere. These are used as a base to analyze and study the data collected.

- Uniform Plumbing Code – India, 2008
- IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
- IGBC Green Landscape Rating system, March 2013
- BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
- Used only for understanding Universal design - Universal accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.
- Reference images for suggestions:
 - ❑ <https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387>
 - ❑ <https://earthbound.report/2021/07/14/5-ways-to-reduce-the-urban-heat-island-effect/>

