Green Audit Report

STEP

SUSTAINABLE TECHNOSOLUTIONS FOR
ENVIRONMENTAL PROTECTION PVT. LTD.

Green Audit Report of Seva Mandal Education Society's Smt. Maniben M. P. Shah Women's College of Arts & Commerce, Mumbai, has been prepared by STEP based on visit to the college campus, checking records and interactions with faculty, non-teaching staff and students. No intrusive study was conducted during the audit.

The audit was conducted on **16th October, 2018.**

The green audit report presents green initiatives followed and taken up by the institution, and provides suggestions and recommendations to improve environmental sustainability.

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CONTENT

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1. Introduction:

Seva Mandal Education Society's Smt. Maniben M. P. Shah Women's College of Arts and Commerce (College) was established in the year 1957. It is affiliated to Shreemati Nathibai Damodar Thackersey (SNDT) Women's University. In the year 2013, the College was reaccredited by National Assessment and Accreditation Council (NAAC) under 'A' Grade with Cumulative Grade Point Average (CGPA) of 3.61/4. The college has been honoured with the University Grant Commission (UGC) status of "College with Potential for Excellence" in the year 2016. The College has 1891 undergraduate and 115 post graduate students enrolled and 50 teaching faculty members on its payroll. The College offers various courses listed below:

Junior College

XI & XII Arts- English, Marathi and Gujarati medium
XI & XII Arts with Home Science- English and Gujarati medium
XI & XII Commerce- English medium

Vocational Courses

Financial Accounts & Office Management
Banking Financial services and Insurance
Catering and Food Product Technology
Child, Old Age and Health care services

Undergraduate

- Bachelor of Arts- (Sociology, Psychology, Hindi, Economics, Marathi literature)
- Bachelor of Commerce- Accountancy, Advertising and Sales Promotion, Computer applications
- Bachelor of Commerce - Accountancy, Finance and Insurance
- Bachelor of Arts- Mass Media
- Bachelor of Management Studies

Postgraduate

- Master of Arts- Counselling Psychology, Hindi Literature
- Master of Commerce- Marketing Management, Advanced Accountancy

Distance Education courses of Mahatma Gandhi Hindi Vishwa Vidyalaya, Wardha

- Master in Business Administration
- Master in Social Work
- Diploma in Journalism and Mass Communication
- Master in Library & Information Science
- Bachelor in Library & Information Science
- Bachelor of Arts - Journalism and Communication
- Post Graduate Diploma in Electronic Media & Film Production
- Post Graduate Diploma in Computer Application

STEP Private Limited (STEP) team visited the college premises on 16th October, 2018 for the purpose of Green Audit. Prior to Audit questionnaire and checklists were prepared. During the audit STEP team visited entire college campus i.e. classrooms, laboratories, library, washrooms, staff rooms, administration department, accounts department and computer laboratories.

Campus Information

Smt. Maniben M.P. Shah College has two premises (building)

Main Building – Smt. Maniben M. P. Shah Women's College	
Floor	**Facilities**
Ground floor	Administration office, Staff room, Principal's room, Server room, Store room, Computer room, President's room, Studio rooms, Canteen, Multipurpose laboratory
First floor	Classrooms, Computer laboratory, Sports room, Psychology laboratory, Food laboratory, NSS cabin
Second floor	Classrooms, Counselling cell, Store room
Third floor	Class rooms, Library, Store room, Advertising department, Language laboratory
Fourth floor	Class rooms, Terrace
Annex floor	Students Common room, AV room, NCC room
Building- Shared with BMN College	
Second floor	Classrooms
Fourth floor	Classrooms, Staff rooms

During Audit, STEP team interacted with following stakeholders:

| Name	Department
Dr. Avaneesh Bhatt	Head of Department English
Mr. Prashant Deshpande	Lecturer
Ms. Gayatri Hardikar	Library assistant
Mr. Bimlesh Sharma	In-charge
Mr. Pravin More	Junior clerk
Ms. Sarita Kasaralkar	Child Care department
Mr. Nitin Thakur	Peon
Ms. Zeenat Kureshi	Student
Ms. Pooja Suvarna	Student
Ms. Neha Sheik	Computer laboratory In-charge
Ms. Archana Bhatt	Junior college teacher

2. Environmental Setting:

The college shares its 4650 square meter campus with Dr. Bhanuben Mahendra Nanavati (BMN) College of Home Science and is situated on Rafi Ahmed Kidwai Road, Matunga. Harbour line of Central Railway forms one of the boundary and Wadala railway station is less than 1km from the College Campus. Gaud Saraswat Brahmin (GSB) sports club ground, which the college hires for annual sports day and other functions is on North-West side. The land use around the campus is mainly residential and educational. There are educational institutes like Veermata Jijabai Technological Institute (VJTI), Institute of Chemical Technology (ICT), Khalsa College and Don Bosco situated within 500 meters.

MMP College Campus

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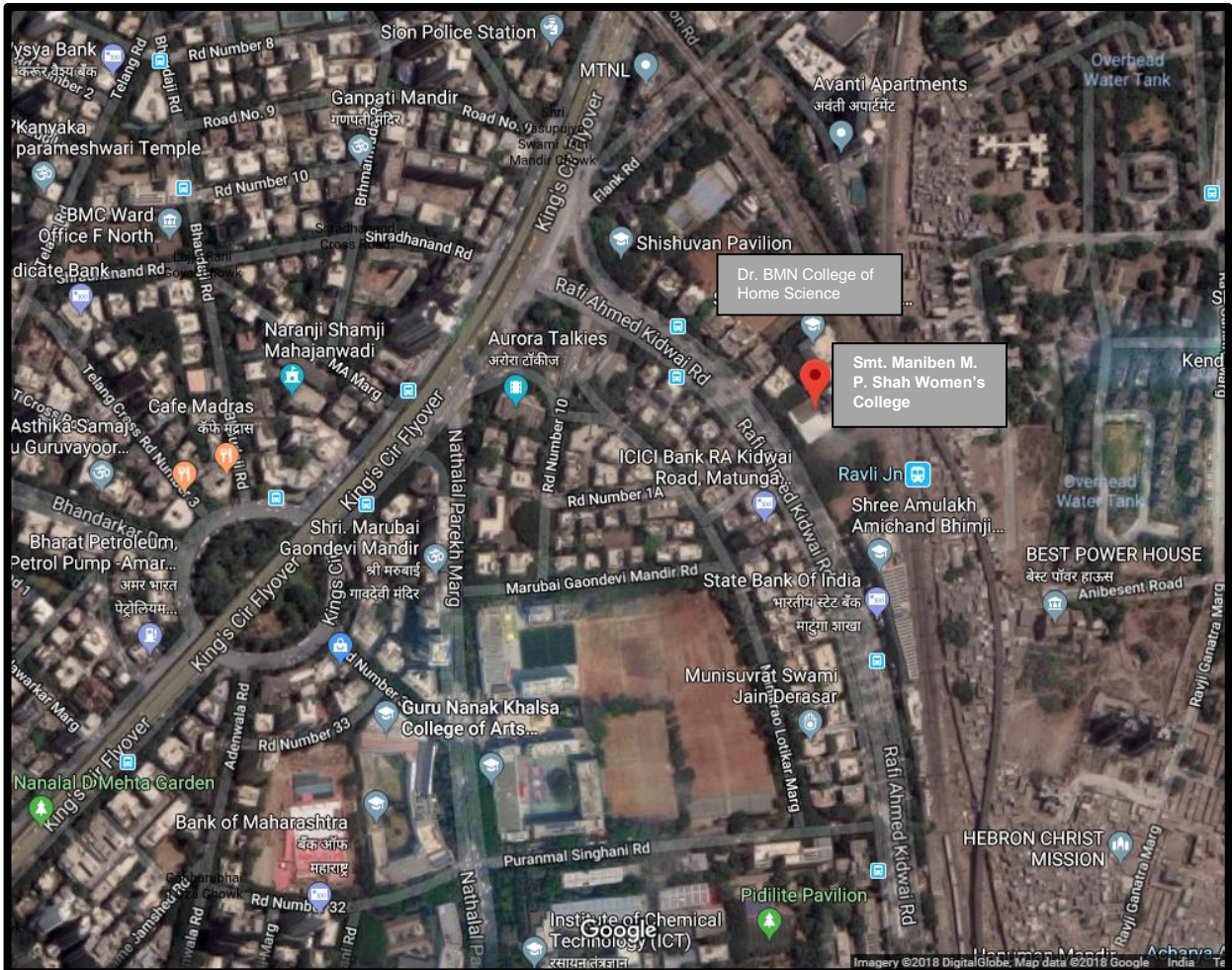
Location of Maniben MP Shah Women College

3. Green Audit:

For Green Audit following 13 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

a) Good Daylight Design and Ventilation
b) Water Efficiency
c) Wastewater Management
d) Indoor Air Quality
e) Energy Efficiency
f) On-site Energy Generation
g) Temperature and Acoustic Control
h) Paper Waste Management
i) E-Waste Management
j) Canteen and Solid Waste Management
k) Universal Access and Efficient Operation and Maintenance of Building
l) Green Belt
m) Green Programs (Green initiatives)

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3.1 Good Daylight Design and Ventilation

a) Corridors are wide with good ceiling height. All the corridors receive good daylight.
b) Classrooms, Labs and Library have high ceiling with wide doors and large windows. Windows are kept open to adequate daylight.
c) Classroom walls, corridors and labs are white-washed, this enhances the daylight received.
d) Curtains are provided on some of the windows to avoid glare.
e) Laboratories are provided with exhaust fans to disperse heat, fumes and odours.
f) Stair cases receive daylight through special openings (Jali's) provided at mezzanine floor.

Good daylight and Ventilation in classrooms
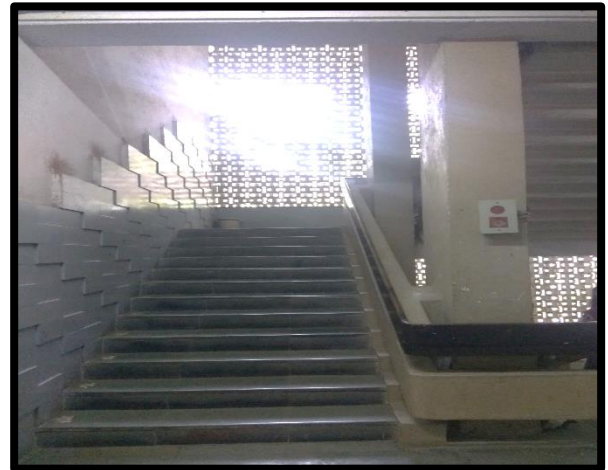
Main staircase which receives daylight

Daylight in Library


Good ceiling height and large windows in Classrooms

3.2 Water Efficiency:

a) Brihanmumbai Mahanagar Palika (BMC) supplies water to the College. BMC charges ₹ 4.91 for 1000 L of water. There is separate water bill for MMP College- Main building. The water

consumption data for period January 2016 to April 2018 is graphically represented in **Figure 1.** Average water consumption in for January-April 2018 is 995 KL/ 3 month (332 KL/ Month, 1100 L/day). This works out to be 500L/per person/day, which is very high compared to standards (http://dasta.in/wp-content/uploads/2015/04/CB_Code_2002.pdf). Water consumption was significantly high in July to October 2017.
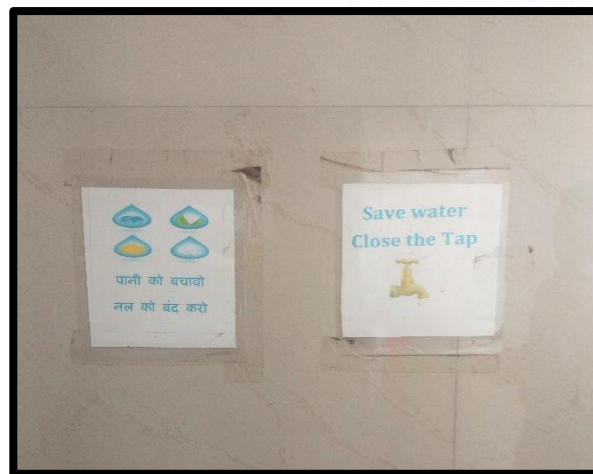
b) Second and fourth floor of BMN College building is also occupied by MMP College. There is a common water bill which is shared with BMN collage, however the college could not give break up of figures of water consumptions in the common building.

Figure 1. Water Consumption- MMP College- Main Building
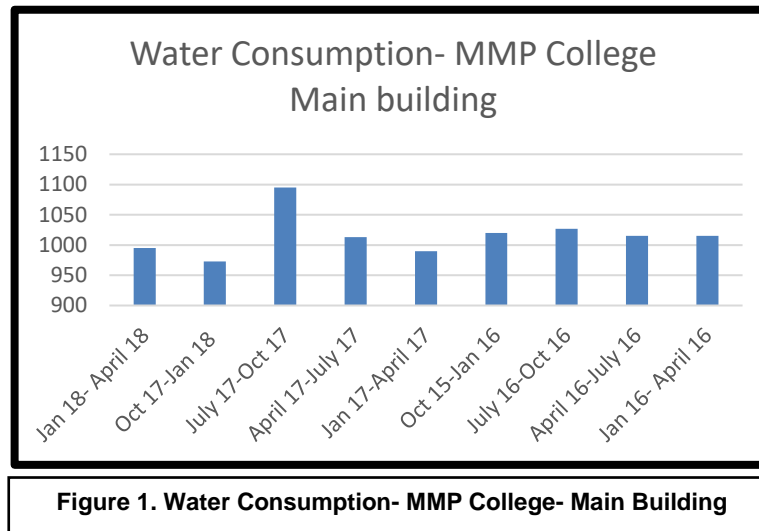
c) Water received from BMC is stored in a storage tank (capacity 50KL) on ground floor and is pumped to the tank located on building terrace (25 KL capacity). From 25 KL tank, water is distributed to washroom basins and laboratories and also used for drinking after purification. The water distribution diagram is presented in **Annexure 2**.

d) Water coolers & purifiers are installed at drinking water supply points.

e) Normally mops are used for floor cleaning and hose is used for cleaning once a week

f) Leaking faucets were seen in washrooms e.g. a leaking water tap was found in girls common room washroom located on terrace floor.

g) Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimising the water footprint of the institute.

h) Dual flushing system is not provided in the washrooms.

i) Signage was present in washrooms emphasising water conservation.

j) Water from air conditioning unit and reject water from water purifiers is used for watering plants within premises.

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| Leaking tap of wash basin | Signage above wash basin |

3.3 Wastewater Management:

a) There is one washroom on each floor of main building plus one washroom is provided in staff roon and in principal's office. Three washrooms are provided in common building shared with BMN College.

b) Sanitary wastewater generated from washrooms is connected to sewerage system provided by BMC. In the water bill BMC levies 70% of charges for sewage treatment.

c) Wastewater/ sewage recycle is not practiced in the College as grey water/ sewage treatment /recycle facility is not provided.

3.4 Indoor Air Quality:

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutant are listed as below:

- Molds and other allergens – This may arise from water seeping into the building envelope or skin, plumbing leaks, condensation due to improper ventilation, or from ground moisture penetrating a building part.
- Carbon monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Volatile organic compounds (VOCs) – VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon dioxide – Due to human respiration
- Particulate matter – Due to construction and maintenance activities

Major observations under indoor air quality are as below:

a) In classrooms the mode of ventilation is natural (through windows) and is enhanced by fans. Air conditioners are used in some of rooms/ labs e.g. computer labs, computer server room.

a) Heating Ventilation and Air Conditioning (HVAC) system does not exists.

b) Smoke detectors are provided in food laboratory.

c) Exhaust fans are provided only in food lab and in some washrooms.

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d) No indoor plants were seen in the entire College. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits. Refer **Annexure 3** for details.

e) Green belts have been set up in campus area.

f) IAQ awareness signage was missing in College. Information on sources, impacts and mitigation of indoor air pollution to be displayed within College for increasing awareness about indoor air pollution.

3.5 Energy Efficiency:

Electricity:

Two electricity meters are provided in MMP Shah College main building. The college also shares with BMN College the electrical bills for the two floors occupied by them. The monthly average electricity consumption of MMP- main building for June- July 2018 is 1920 KWh (units). Electricity consumption of MMP- Main building is graphically represented in **Figure 2&3** respectively.

The details on sources of consumptions at each metering location were not available for review. Break up of energy consumption in common building (shared with BMN College) were also not available.
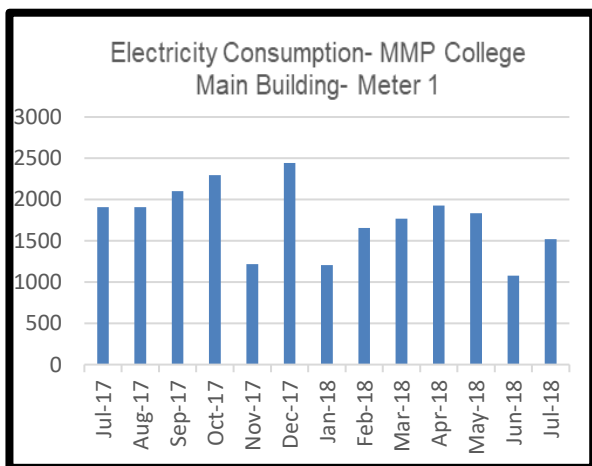
Figure 2. Electricity Consumption- MMP College- Main Building- Meter 1
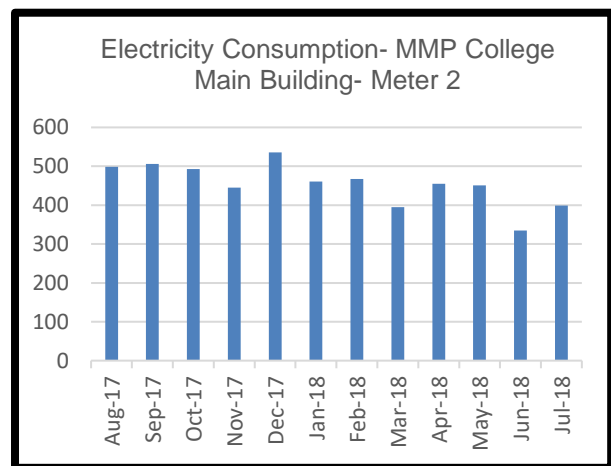
Figure 3. Electricity Consumption- MMP College- Main Building- Meter 2

The above graphs indicate that the energy consumption in June-July 2018 has decreased as compared to June-July 2017. The maximum energy consumption is in the month of December 2017 followed by October 2017 and the minimum energy consumption is in June 2018. This may be due the college has holiday period in May/ June each year. Decrease in energy consumption is observed (approx. 20%) from 2017 to 2018 due to implementation of suggestions of Energy audit conducted by the College.

The areas of major consumption of electricity are:
Tube Lights – 492 approximately
Light Emitting Diode (LED), compact fluorescent light (CFL) bulbs – 71 & 43 respectively
Fans – 336 approximately
Air Conditioners – 11 (Energy rated)
Computers - 105 units approximately

Printers – 20 units
Projectors – 19 units
Refrigerators- 4 units
Baking oven- 1 unit
Microwave- 4 units

The list of electrical appliances and possible energy intensive areas in the college is provided in **Annexure 4**.

It was observed that:

a) Conventional tube lights & fans are installed in classrooms and labs. College has carried out energy audit in the year 2015. As per the audit recommendations, College is in the process of replacing periodically the dysfunctional conventional tube lights with LED lights.

b) MMP has some air conditioners with three-star ratings. (Standards set by Bureau of Energy Efficiency (BEE)].

c) The refrigerators installed in food laboratory and college canteen also have three-star ratings.

d) Uninterruptible Power Supply (UPS) system is not present in computer laboratory. UPS system is typically used to protect hardware such as computers, data centres, telecommunication equipment or other electrical equipment where an unexpected power disruption could cause serious business disruption or data loss.

e) It was observed that reflectors are not provided for tube lights which can reduce electricity consumption.

f) All the computers have LED screens; Computers are shut down when not in use.

g) In most of the classrooms separate switches are provided for tube-lights and fans. So it is possible to switch on a specific light or a fan and to avoid wastage of energy due to common area illumination. However some classrooms and library have multiple connections to single switch.

h) Library has multiple tube lights which can be replaced by LED.

i) Signage is present near every electrical switch board encouraging users to switch off light and fans to save electricity.

j) There is no renewable source of energy used e.g. solar, wind. However, college is planning installation of solar panels to meet the electricity requirements.
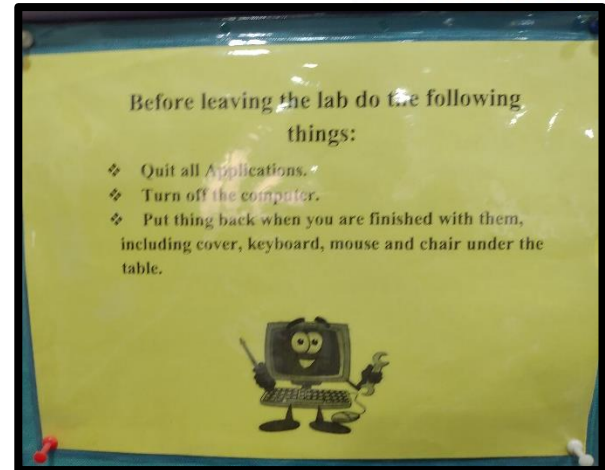
Dual tube lights in library	Star rated air conditioner

| Signage above switch board | Signage in computer laboratory |

3.6 On site energy generation (usage of LPG/ Natural Gas):

a) Canteen facility is present in the MMP- main building.
b) Natural gas pipeline is provided in food laboratory and in the canteen for cooking.
c) No back-up diesel generators are provided.

3.7 Temperature and Acoustic Control

a) White washed rooms & corridors and white/ off-white flooring improve the lighting conditions.
b) MMP is located between a main road in the front and railway track on the back side. There is major noise pollution due to road traffic as well as due to train movement. Case studies and literature review indicate noise levels dAB near the railway track are 70-75 dAB www.researchgate.net/figure/1-Noise-Levels-in-dB-Noise-Climate-and-Noise-Pollution-Levels-in-the-study_tbl1_279861861

View from classroom near railway track

c) MMP has done tree plantation around the building which may help in reducing temperature and abating noise pollution.

Green belt in College Campus

Green belt in College Campus

3.8 Paper Waste Management:

Being academic institution, waste paper is the main solid waste generated in the premises. The College has taken steps to minimise and avoid paper usage.

It was observed that:

a) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy, digitalisation (scanning) is practised.

b) The college library is connected to other college libraries under the Inter Library Loan facilities, E-Library facilities with INFLIBNET N-List.

c) Offline e-resources such as CD-ROMS and DVDs are available on selected topics in the library. Library is in the process of initiating E-book system.

d) Internal notices and communications are through E-mail/SMS.

e) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.

f) Paper notices are displayed on the notice boards .The dissertation reports, journals, and answer papers are stored as per the University rules. Most of the storage is in library and staff room. After couple of years, old submissions and answer papers will be archived and stored in record room.

g) Old papers are given to 'Stree Mukti Sanghatana' in exchange of new papers, in the ratio (60:40).

Library

Old papers stored in store room

3.9 E-Waste Management:

a) MMP is digitalized to a large extent. This includes classrooms, library, internal mails etc.
b) The College has 105 Personal Computers, 20 printers, 11 air conditioners in working condition.
c) E-waste is collected and stored in respective department. Once in a year this e-waste is collected from respective department and given to 'Stree Mukti Sanghatana'.

3.10 Solid Waste Management:

It was observed that:
a) Wet waste and dry waste segregation is not practised in the premises. No separate bins are provided for wet biodegradable and dry recyclable waste.
b) Combined waste is directly handed over to the BMC.
c) Biodegradable waste is mainly generated in canteen and in food laboratory. However, there is no signage for minimising food wastage or for promoting segregation of wet and dry waste.
d) Sanitary Pad vending machine with incinerators are installed in two ladies washroom.
e) In other areas like classrooms, mostly paper waste and plastic wrappers are generated.
f) Scrapped benches are repaired and reused.

Sanitary pad vending machine

| Sanitary pad incinerator |
|---|

| **Dustbin for waste collection** | **Scrapped benches being recycled** |

3.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a) College is easily accessible from the main road. Staircase is provided for staff and students. Ramps are provided for physically handicapped people. Elevator is used by college staff and physically disabled students.

b) There are two exits provided for the main building. Staircases and classrooms have wide windows, which can allow safe evacuation during emergency.

c) Since the access and staircases are wide and uncluttered, it is possible to have a safe evacuation during emergency.

d) Fire extinguishers and fire hydrants are provided in few areas for emergency. They are inspected and serviced by fire protection service company annually.

e) There is no signage for emergency fire exit. This is of crucial importance during emergency.

f) All teaching and non-teaching staff have undertaken 1 week 'Fire Safety & Hazard Management Training' in October 2018. Such programmes should be conducted annually for staff as well as for students.
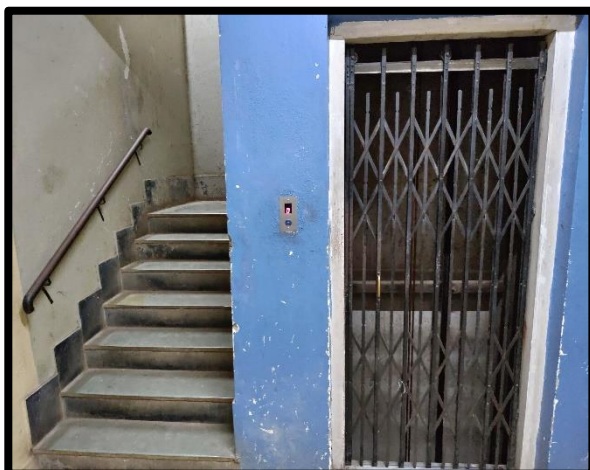
| **Handrail for safety** | **Ramp at the entrance** |

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| Fire extinguisher | Fire alarm |

3.12   Green belt/ Landscaping:

a) The college has a campus of 4650 square meter. Large trees are planted in the premises. Plantation also helps maintaining lower temperatures of the area. .
b) Potted plants are kept at the back side which are brought indoors on certain occasions.
c) Indoor plants can be kept along the corridors and entrance of the building.
d) Vertical Gardening is a possibility on the compound wall of the College Campus.

3.13   Green Initiatives:

a) College has a 'Nature Club' which organises different green programmes throughout the year. e.g. Nature Club has arranged visit of 80 Junior college students to an exhibition on 17th December 2016 where they were shown the art of making natural colours used in Ellora wall paintings. Documentary screening on 'Naate Paschim Ghaataashi', a film on Western Ghats forests was organised on 23rd August 2016.
b) NSS Unit of college participated in 'Cleanliness Drive Awareness Programme' at King's Circle railway station, in collaboration with Central Railway Station Mumbai Division from 17th September to 25th September 2016. During the programme, volunteers prepared slogans and posters related to cleanliness and conducted oath & signature campaign for railway passengers for keeping the platforms clean.
c) In collaboration with Indian Development Foundation (NGO), Mumbai, National Service Scheme (NSS) unit initiated a project on 'Dry Paper Waste Management' from 13th January 2017. A person from the NGO visits the premises every Friday for collection of waste paper, receipts, tickets, paper bags, paper plates, paper glasses, old newspapers, magazine and old books etc. donated by the college students and staff.
d) Currently college is in collaboration with the NGO 'Stree Mukti Sanghatana' for waste paper management.
e) NSS volunteers participated in survey of Bio-toilets organized by Organica Biotech Pvt. Ltd. on 27th March 2017.

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f) 36 volunteers from college participated in 'Swacchata Abhiyan' on 10th August 2017, at Wadala gate No. 4. They cleaned the area around Wadala slums

g) On the occasion of 'Van Mahotsav', NSS Unit organized a 'Tree Plantation Drive' on 1st July 2017 in association with the Lions Club of Sion.

h) Eleven students participated in the essay writing competition on 'Clean environment', 'Swaccha Sankalp se Swaccha Siddhi', at Nehru Yuva Sangathan.

i) Institute had held a talk on 'Dry Waste Management' by Mr. Ajay Singh for the students of Economics Department.

j) In September 2018, NSS Unit of college had organised a 'Campus Cleaning Drive'. About fifty students and four six teachers participated in the event.

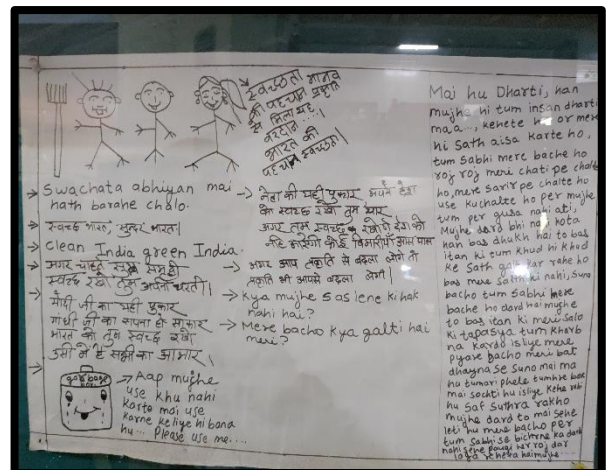k) College is planning to install solar panels to promote use of renewable energy.

Environmental week celebration

Environmental week celebration

Best out of waste created by Child Care Dept.

Cleanliness message on a notice board

4 RECOMMENDATIONS/ SUGGESTIONS:

4.1 For Improving Energy Consumption:

a) Every classroom and lab with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.

b) Installation of automatic lights with sensors can be considered.

c) Conduct energy audit every two or three years and determine the lux levels within College. Energy audit can help in reduction in number of light fittings/ energy usage in the College.

d) Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing. Equipment with star rating, using eco-friendly materials; with safe disposal policy to be preferred. Policy of returning equipment at the end of life span to the supplier to be preferred.

e) For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.

f) Usage of light reflectors is recommended as the reflectors can spread light to relatively large areas.

g) If possible, computers should be switched off from main power connections.

h) Notices/ signages can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all electricals when not in use.

i) Control sensors can help to reduce consumption by automatically dimming lights when people are not around, and keeping blinds open to use natural light & reduce energy consumption.

j) Install Solar Energy (Photovoltaic or Solar Panels) for sustainability.

k) Raise awareness:
   - Encourage students to help in monitoring energy consumption & implement corrective actions
   - Integrate energy education into classroom learning.

4.2 Water Conservation:

a) Rooftop Rain Water harvesting technique can be practised through which rain water is captured from the roof catchments and stored in reservoirs. Harvested rain water can be stored in sub-surface reservoir to meet the institutional needs e.g. for garden, washroom etc. and for other purposes such as groundwater recharge.

b) Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs.

c) Dry sweep or use a sponge broom when possible, instead of using a hose to clean floors, sidewalks, or other hard surfaces.

d) Minimize/ reduce water usage by installing water saving faucets such as pressmatic taps, tap aerators, jet sprays etc.

e) Dual flushing system can be installed for toilet flushing which saves considerable amount of water.

f) Grey water/ sewage recycling system can be installed for flushing toilets. This will reduce the fresh water footprint.

g) Installation of waterless urinals can be considered to reduce water consumption.

h) Water balance diagram can be prepared to quantify the water consumption by installing water meters at key points. Based on data gathered, appropriate measures can be taken to reduce the water consumption.

4.3 Paper and other Solid Waste Reduction:

a) Inventories of all solid waste generated in the premises must be maintained.

b) There should be waste segregation practices at source. Separate bins to be provided.

c) Enhance recycling. This can be done by creating a group where students can recycle books, personal clothes and other material to needy students. This can be an initiative under green program.

d) Standard Operating Procedures (SOP) for Solid and E-waste management and for recycling of waste should be prepared & practised. The SOP's may include collection, segregation and reuse of different types of wastes, if any (e.g. biodegradable waste for composting). This will help in safe disposal of waste to recycle agencies.

e) Training as well as awareness programs should be organized on segregation of biodegradable waste and recycling of waste. Efforts should be taken to inform students about recycling options and signs should be posted on appropriate bins indicating what could be dumped in each bin.

f) Biodegradable waste from canteen can be used for composting. 1 tonne of mixed waste can generate 60-70 kg of compost.

g) Plastic bottles to be handed over to PET recyclers.

h) The college can introduce online app, which can be useful for conducting internal exams, assignment/ reports submission. This system can also be used for displaying important notices, timetables.

i) Paper usage shall be monitored to understand the impact of digitisation in the facility.
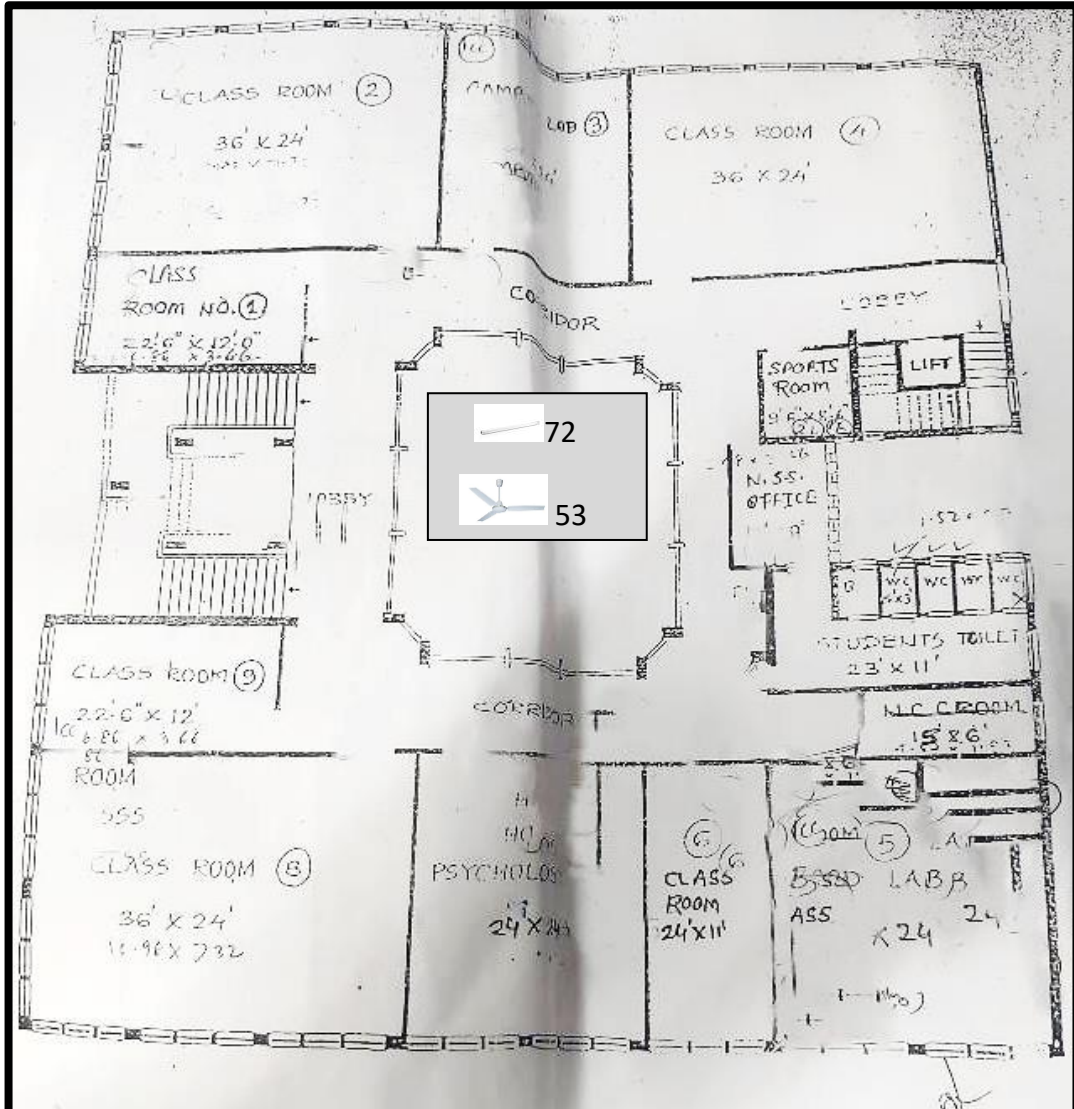

4.4 Others:

a) Environmental advisory committee could be formed. The discussions/ information sharing among different departments can generate lot of ideas and awareness on green issues.

b) Maintain minutes of meetings of environmental committees; evaluate the effectiveness of various environmental programs conducted by the institutes. Set annual targets for Green Initiatives & monitor them closely. Create 'Green Champions'.

c) Since each student uses computer lab, the screen savers can be set up for creating environmental awareness. (Ergonomics, water conservation etc.). Short 30 second pop up can be displayed on computer screens when they are on standby mode. Or wallpapers informing students about environment conservation can be created.

d) Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.

e) Adopt environmentally responsible purchasing policy, and work towards creating and implementing a strategy to reduce environmental impact of its purchasing decision.

f) Small composting facility can be provided for canteen to treat the biodegradable waste. Compost generated can be utilised for plants near compound wall.

g) Vertical gardening can be done using indoor plants. Hydroponic garden can be an option where in small space also plants can be planted. Drip irrigation system can be provided for plants.

h) Noise Barriers:

- Noise due to railway track behind the college, can affect students' ability to concentrate. Detail study of auditory environment in the classroom may be required. If a classroom has high or persistent levels of background noise, the learning environment may be compromised.
- Soundproof curtains are one of the easiest ways to combat noise.
- The college can also abate noise by creating outdoor barriers e.g. by building a fence around college yard. The college can further reduce soundwaves by adding a row of shrubs or bushes in front of the building.

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Ground Floor:

Accounting Department, Staff Canteen, Staff Room, Principal's Room, Server Room, Administration Office, Office, Enquiry /placement office, Record Room, Principal's Room, Staff Toilet, Students' Toilet

ANNEXURE 1: MMP Institute Floor Plan
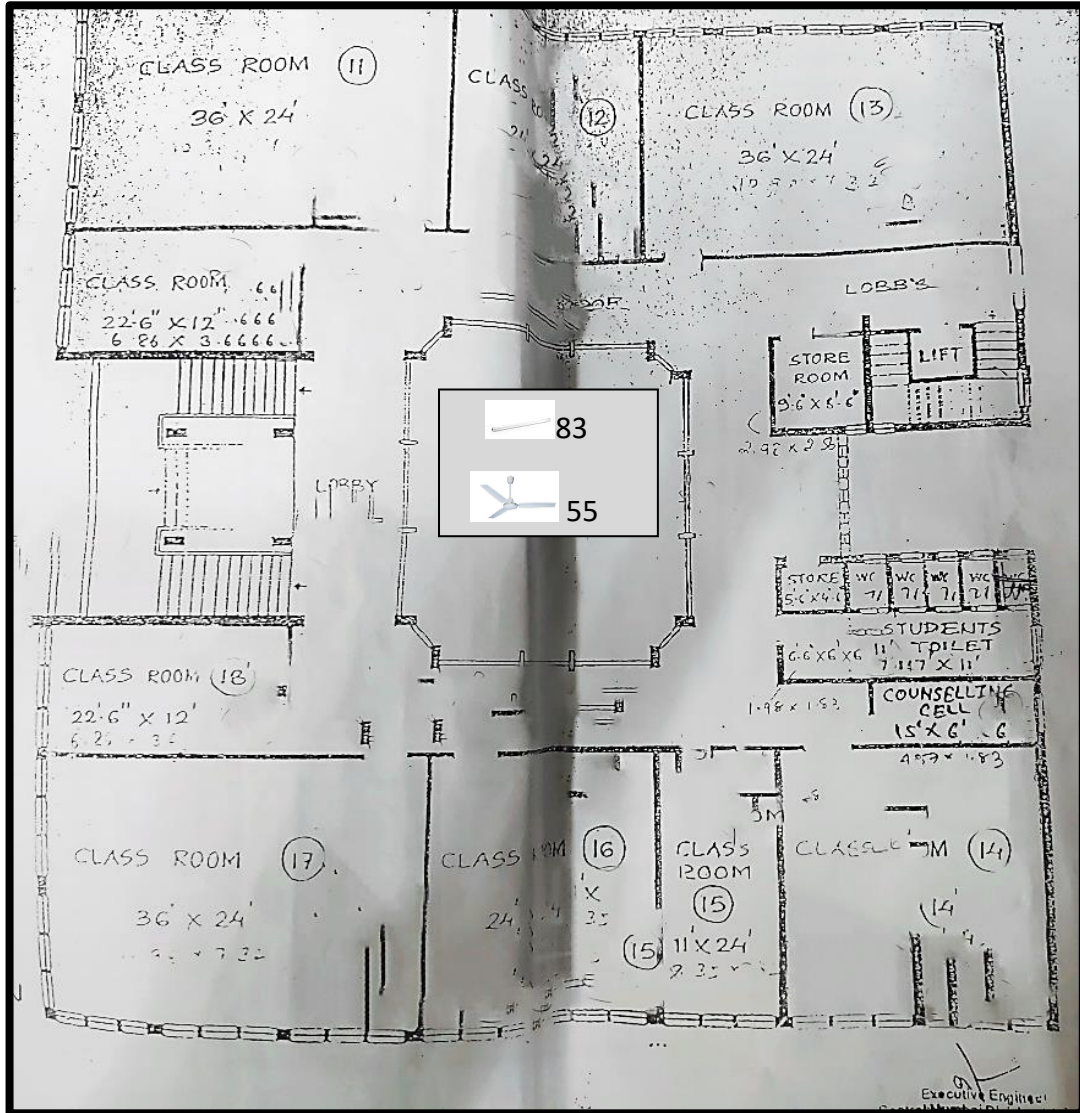
First Floor

First Floor:

Classrooms, Computer Laboratory, Food Laboratory, Psychology Laboratory, Sports Room, NSS Office, Students' Toilet

Second Floor:

Classrooms, Store room, Students' Toilet, Counselling Room
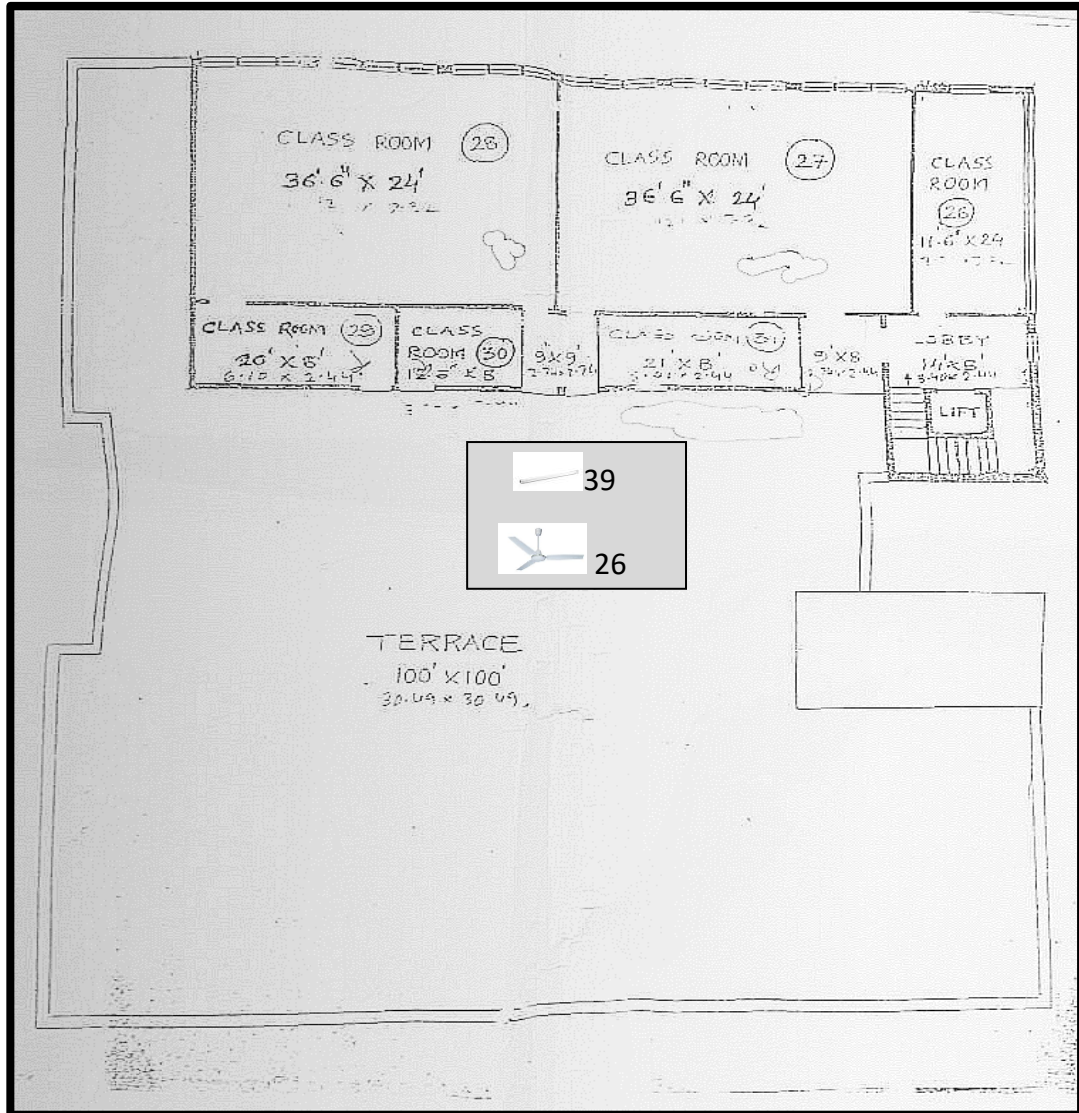
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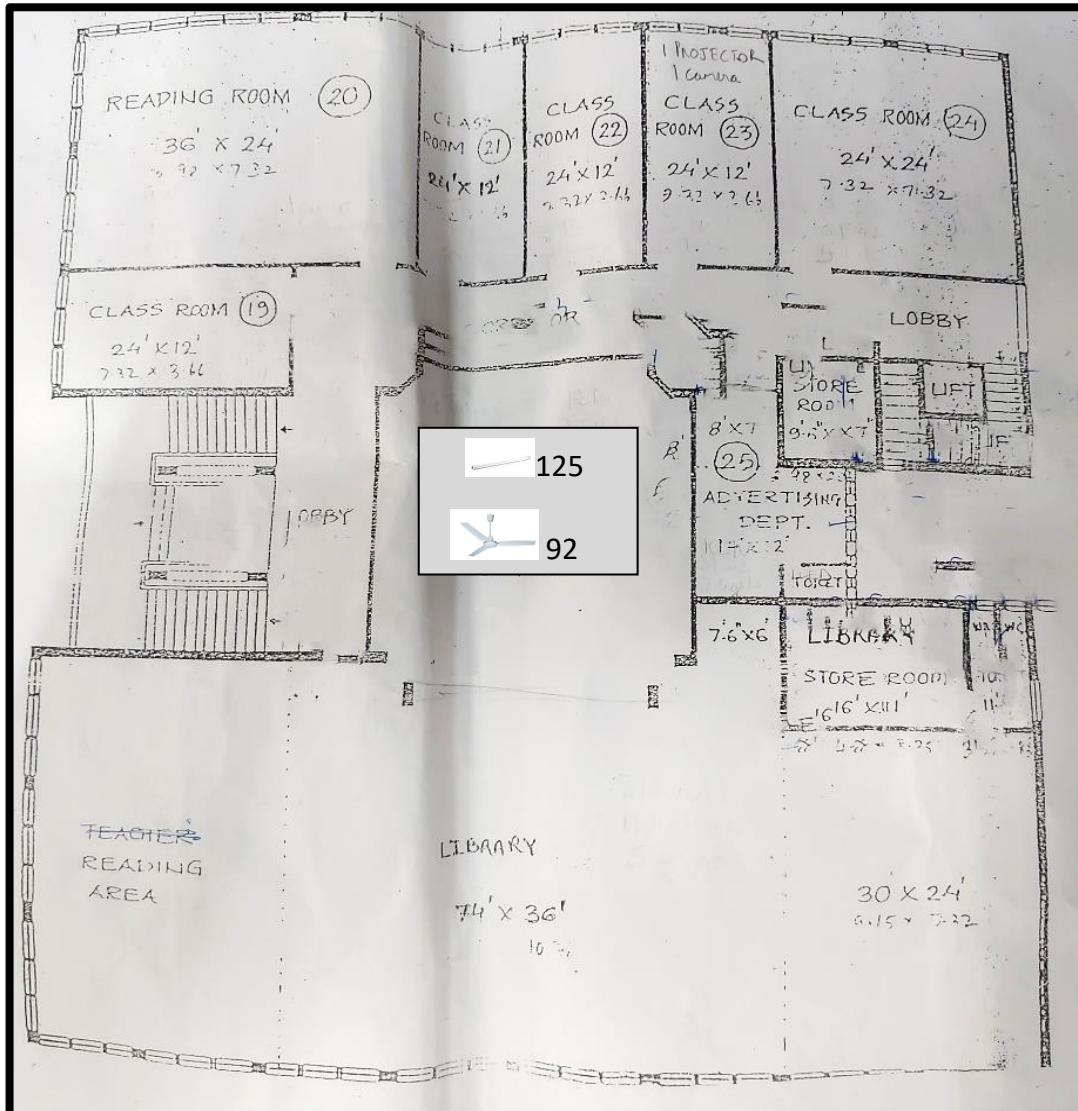
Third Floor:

Classrooms, Advertising Department, Library, Audition Room, Visual Room, Language Room, Students' Toilet
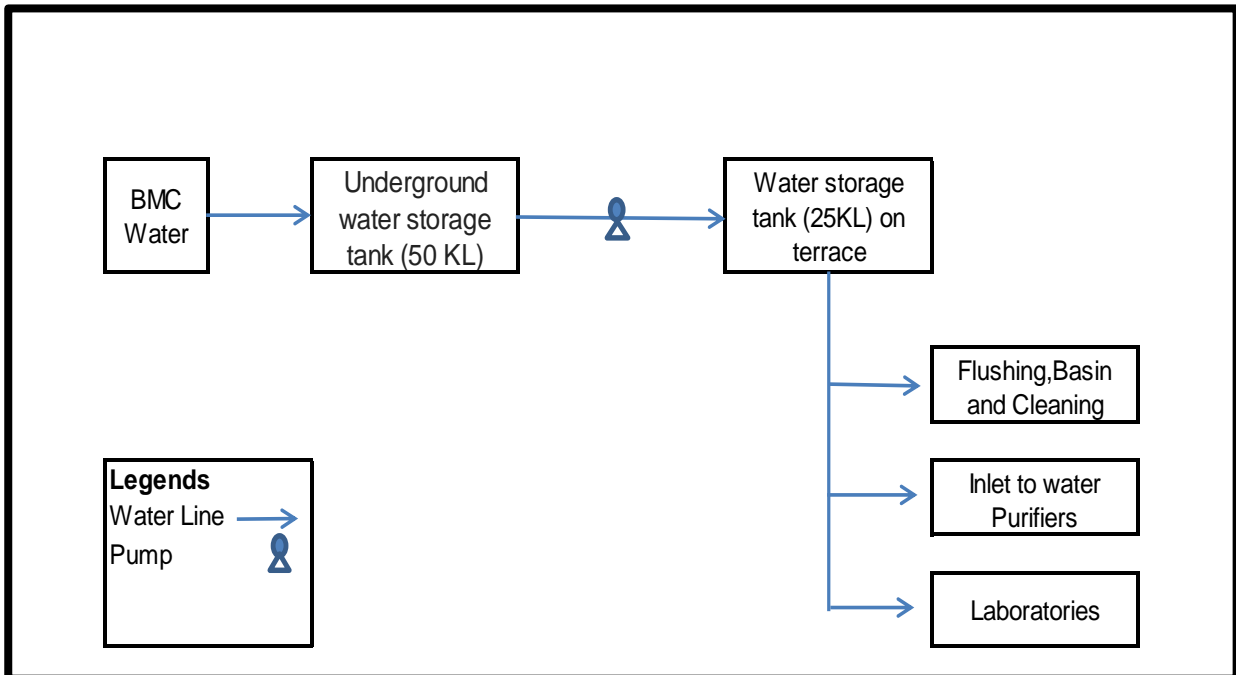
Terrace Floor

Terrace Floor:

Classrooms, Girls' common room, Students' Toilet

Annexure 2: Water Distribution Diagram

Diagram:

BMC Water → Underground water storage tank (50 KL) → [Pump] → Water storage tank (25KL) on terrace

Water storage tank (25KL) on terrace →
- Flushing, Basin and Cleaning
- Inlet to water Purifiers
- Laboratories

Legends
Water Line →
Pump

Annexure 3: Indoor Gardening Details

Indoor plants are commonly used for their aesthetics benefits but they also have vital role reducing airborne pollution. The right choice of plants can be an excellent way of improving indoor air quality and general health. Local landscape contractor can be contacted for supply and rotation of these plants.

Plants	VOC it removes	Indoor source of VOC's	Plant care
Aloe Vera	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
Bamboo Plant	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain
Chinese Evergreen	Benzene	Paints	Low maintenance plant that prefers low light conditions.
English Ivy	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

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Janet Craig	Formaldehyde, Benzene and Trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
Golden Pothos or Devils Ivy	Formaldehyde, Cleanses air	Exhaust fumes, carpeting materials, panelling and furniture products made with particle board	Extremely easy to maintain under low to bright light conditions. Fast growing and grows well under Fluorescent light.
Mass Cane	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
Snake plant	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety Of light conditions. Hard to damage or kill.

\n**Peace Lily**	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Relatively easy to maintain. Survives in low light conditions.
\n**Red-edged Dracaena**	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety of light conditions. Hard to damage or kill.
\n**Spider Plant**	Formaldehyde, benzene, carbon monoxide and xylene	cooking fuels, wood products, Printing	Easy to maintain under medium to bright light condition.
\n**Parlor Palm**	Purifies indoor air	-	Easy to maintain

Annexure 4: List of Electrical Instruments and Energy Intensive Areas

Sr. No.	Facility	Details of Provisions
1	Total Classrooms - 30 Nos.	Projectors, Speakers, CCTV
2	Staff Rooms -2 Nos.	Microwave
3	Library	10 Computers, 2 CCTV, 3 Printers
4	Food Laboratory	Baking oven, Refrigerators, Exhaust fans, Projector, Mixers, Microwave
5	Language Room	Air conditioner, 13 Computers, 2 CCTV
6	Visual Room	3 CCTV, 4 Speakers, 3 Air conditioner, Projector, Computer
7	Computer Laboratory	38 Computers, 3 Air conditioners, 2 Printers, 2 Scanners
8	Multipurpose Laboratory	15 Computers, 1 projector
9	Sports room, NSS office, Psychology Laboratory, Counselling room, Audition room	CCTV, Projector
10	Director's room, Principal's room	1 Computer, 2 Air conditioners, 2 Printers, Microwave
11	Office	9 Computers, 3 Printers, Microwave
12	Administration office	7 Computers, Cash machine, 2 Printers
13	Accounts Department	15 Computers, 3 Scanners, Projector, CCTV
14	Sever Room	5 Computers, 2 Printers, Air conditioner

Annexure 5: Green Audit Checklist

Good Daylight Design

Sr. No.	Design Feature	
1	Broad door opening	✓
2	Clerestory/ High windows	✓
3	Openings at the eastern and southern side	✓
4	Rectangular building so that sunlight can reach all areas	✓
5	Sunshade	-
6	Double or triple glazing on windows	-
7	Enough illumination	✓
8	Light coloured fabric curtain or blind for window covering	✓
9	Operable/ openable windows	✓
10	Ultraviolet (UV) filtering windows	-
11	Use of exterior louvers to control glare	-
12	Use of glass as facilitator of natural light	✓
13	Use of insulated and tinted glass to filter heat gain	-

Ventilation

Sr. No.	Design Feature	
1	Downdraft cooling system (a downward flow of air)	-
2	Ceiling height	✓
3	Self-movement ventilators in the roof	-
4	Wide corridors	✓
5	Operable windows	✓
6	Use of exhaust fans	✓

Temperature and Acoustic Control

Sr. No.	Design Feature	
1	Double roof	-
2	Earth air tunnel (cools air in summer and heat it in winter)	-
3	Green roof	-
4	Mud roof	-
5	Openings at the eastern and southern side	✓
6	Roof with reflective tile/aluminium/asbestos	-
7	Sand stone cladding outside the walls	✓
8	Special walls for temperature control(Thick/Double/cavity/fire/composite /green)	-
9	Use of cool roofing material (mineral wool, rock wool, vermiculite, foams, expanded polystyrene, extruded polystyrene etc.)	-
10	Use of daylight design (Building is constructed in such a way that diffused sunlight allows light but not the heat)	✓
11	Use of insulation material (e.g. autoclaved aerated blocks, hollow blocks, Thermocrete or higher R- value material)	-
12	Use of water bodies/fountain	-

13	Climbing creepers fitted to window in summer	-
14	Lime coating for cool roof	-
15	Retrofitting the existing roofs with cool roof technology	-
16	White wash on the roof	✓
17	Use of landscaping as sound barrier	-

Water Efficiency & Wastewater Management

Sr. No.	Measures	
1	Aerators to water taps	-
2	Automatic toilet faucets	-
3	Drip irrigation (for plant watering system)	-
4	Dual flush toilet with cistern	-
5	Efficient plumbing system	✓
6	Sewage treatment plant for sewage recycle	-
7	Rainwater harvesting	-
8	Regular maintenance for leakage free plumbing system	✓
9	Use of low flow/flow control water equipment or gadget	-
10	Water free urinals (No flush urinals/Zero flush urinals/Water less urinals/air based flushing system these save water used in toilet)	-

Energy Efficiency and On-site Energy Generation Mechanism

Sr. No.	Measures	
1	Avoid excessive lighting	✓
2	Computerized monitoring of electrical system	-
3	Integrated energy saving design for natural cooling/heating	✓
4	On-site energy generation	P
5	Photocell occupancy sensor for automatic light control	-
6	Regular maintenance of electrical system	✓
7	Use of day lighting system	✓
8	Use of energy efficient equipment	✓
9	Use of energy saving bulbs (Compact florescent light/LED lights)	P
10	Solar panel	P

Sustainable Material for Building and Interior

Sr. No.	Strategy adopted	
1	Use of biodegradable material	✓
2	Use of locally sourced material	✓
3	Use of material with low embedded energy(i.e. stabilized earth blocks, straw bales, stones, sand stone chips, fly ash)	✓
4	Use of nontoxic recycled content material and furniture	✓
5	Use of post-consumer recycled material	✓
6	Use of salvaged (Discarded or refused) material	✓
7	Use of material which can recycled at end of useful life	✓
8	Use of material which is simple to install without dangerous adhesive	✓

Waste Management

Sr. No.	Measures	
1	Sale of books to its user for minimal charges	-
2	Sale of books to store or other library	-
3	Sale of weeded books to needy students	-
4	Send books and used papers to recycling organization	✓
5	Avoid use of paper by going digital (Paper)	✓
6	Lessen the margins while printing	-
7	Printing on both sides of paper	✓
8	Reuse of printed paper/ envelops	✓
9	Segregation of dry and wet waste	-
10	Setting up recycling area/ composting area	-
11	Creation of specified junctions for collection of E-waste(E-waste)	-
12	Donation of computers to NGO's to refurbish and give it to needy people	✓
13	Hand over to organization or recycler who knows proper disposal system	✓
14	Implementation of any recycling project or program	-
15	Purchase of electronic products from company's which have after sales service for the disposal of product with buyback policy	✓
16	Installation of bins to collect garbage	✓
17	Outsourcing recycling of garbage to agency	-
18	Recreating in to new sustainable products	-
19	Use of coloured bins with code to collect garbage	✓

Environmental Audit

Sr. No.	Type of audit	
1	Energy audit (includes energy consumption, thermal comfort, visual comfort)	✓
2	Sound/ Noise audit (includes indoor noise level, outdoor noise level)	-
3	Water and waste audit (includes water quality, solid waste generation, solid waste disposal process)	-

Universal Access and Efficient Operation and Maintenance of Building

Sr. No.	Design feature	
1	Easy access to the main entrance of the building	✓
2	Elevator	✓
3	Preferred car park spaces for specially abled	✓
4	Ramp/ stairs with handrails on at least one side	✓
5	Restrooms (toilets) in common areas	✓
6	Uniformity in floor level	✓
7	Audio guidance for specially abled	-
8	Availability of wheel chair	-
9	Braille assistance for specially abled	-
10	Personalized services by staff for differently abled	✓
11	Visual warning signage in common and exterior areas	-
12	Follow standard procedures for commissioning of electrical/plumbing system	-
13	Purchase of standardized and quality material for repair	✓

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14	Regular maintenance of building	✓
15	Use of chemical free products for cleaning	-
16	User awareness program to minimize damage of property	✓

Green Program

Sr. No.	Green program	
1	Buying recycled material	✓
2	Creation of "Green Team" in the institution/library	-
3	Green education i.e. to become leader in environmental awareness	-
4	College conduct graduate program by library science/Any other department e.g. "Eco-Friendliness: Changing our communities' one step at a time."	✓
5	Outreach relationships with local groups interested in environmental concern and satisfy their information needs	✓
6	Providing external membership to small and local libraries (MOU with other colleges, -internal collegiate library loan)	-
7	Recycling beyond books i.e. paper, aluminium, plastic, e-waste	-
8	Reduce, Reuse and recycle of the products (At the time of disposal of library material)	✓
9	Regular purchase of books/ magazines related to sustainability	✓
10	Selection of material content of which informs and assesses green practices (green computing, energy conservation, organic gardening etc.)	-
11	Contribute library information on sustainability resources to a campus publication, blog or website	-
12	Creation of topical online resource guide (on sustainability etc.)	✓
13	Disseminating expert advice about sustainability to other colleges to make their own college greener	-
14	E Publishing reviews of new green resources in the newsletter or news	P
15	Digitization	✓
16	E-archiving	P
17	E-resources : E books, Online Journals, membership of consortium	P
18	Subscription to databases	✓

√- Provided   P - Planned