ENVIRONMENTAL AUDIT REPORT
of
MIT ART, DESIGN AND TECHNOLOGY UNIVERSITY
LoniKalbhor, Pune 412201

Year: 2020-21

Prepared by

Enrich Consultants

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MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

Maharashtra Energy Development Agency

(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
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ECN/2021-22/CR-14/1577 — 22nd April, 2021

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : **M/s Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2021-22/Class A/EA-03***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/MITADT/20-21/03 Date: 28/10/2021

CERTIFICATE

This is to certify that we have conducted Environmental Audit at MIT Art, Design and Technology University, Loni Kalbhor, Pune 412 201,in the year 2020-21.

The University has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings.
- Installation of 732.2 kWp Roof Top Solar PV Plant.
- Installation of 77500 LPD Solar Thermal Water Heating System at Hostel blocks.
- Usage of Battery Operated Vehicles for transport within the campus
- Maximum Usage of Day Lighting
- Installation of Organic Waste Converter
- In process installation of Sewage Treatment Plant
- Implementation of Rain Water Harvesting Project

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green& Eco Friendly.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of MIT Art, Design and Technology University, Loni Kalbhor, Pune, for awarding us the assignment of Environmental Audit of their Loni Kalbhor Campus for the Year: 2020-21.

We are thankful to:

- Prof. Dr. Mangesh T. Karad, Executive Director & Vice Chancellor
- Prof. Dr. Anant Chakradeo, Pro Vice Chancellor
- Dr. Mangesh Chopade, Registrar

We are also thankful to the Director Internal Quality Assurance Cell, Head of the Departments & other staff members for helping us during the field study.

EXECUTIVE SUMMARY

After the Field Study & Analysis, we present herewith important observations made during the assignment of Environmental Audit.

1. MIT Art, Design and Technology University, Loni Kalbhor, Pune consumes Energy in the form of **Electrical Energy** used for various Gadgets, Office Equipment, Laboratories, Vehicles & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	1877535	1689.78
2	Maximum	262419	236.18
3	Minimum	119276	107.35
4	Average	156461.25	140.82

3. Pollution caused by Day to Day Operation:

- **Air pollution:** Mainly CO_2 on account of Electricity & LPG Consumption
- **Solid Waste:** Bio degradable Waste, Garden Waste, Recyclable Waste and Human Waste
- **Liquid Waste:** Human liquid waste

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The University has installed **732.2 kWp** Roof Top Solar PV Plant and 77500 LPD Solar Thermal Water Heating System at the Hostel Blocks.
- Solar Energy Generated is **878640 kWh.**
- The reduction in CO_2 Emission due to usage of Alternate Energy is **791 MT**.

5. Indoor Air Quality Parameters:

No	Parameter/ Value	AQI	PM-2.5	PM-10
1	Maximum	95	54	66
2	Minimum	10	4	6

6. Indoor Comfort Conditions:

No	Parameter/ Value	Lux Level, Lumen	Noise Level, dB	Temperature, ^0C	Humidity, %
1	Maximum	636	156	33	99
2	Minimum	13	38.3	20	55

7. Water Consumption:

The estimated Water Consumption of the University is about **516500 Liters/Day.**

8. Waste Management:

8.1 Recyclable/Solid Waste Management:

This includes: paper waste, card board waste, plastic waste and other recyclable waste generated in day to day operations. At important locations, Waste collections Bins are placed in order to segregate the Waste at source. The University has dedicated House Keeping Team.

8.2 Organic Waste Management:

The University has installed an Organic Waste Converter. The fertilizer produced is used for own garden and also sold in the market.

8.3 Liquid Waste Management:

The University is in a process of installing Sewage Treatment Plant near the Staff Quarter. At present the Liquid Waste is drained directly into the river.

8.4 E-Waste Management:

It is recommended to dispose of the E-Waste generated through Authorized Vendor.

9. Rain Water Harvesting:

At present the University has installed Rain Water Harvesting Project at Engineering & I T Building. The survey is going on to implement the Rain Water Harvesting project at all the Buildings in the campus.

10. Environment Friendly Initiatives:

- The University has well maintained Internal Garden, Lawn and Tree Plantation.
- There are about **4000 plus Trees** belonging to **38 species** in the campus.
- The Total Green Cover area is about**16.225 Acres.**
- The Carbon-Di-Oxide sequestered is about **483.2 MT.**
- Usage of Battery Operated Vehicles in the campus.
- To make aware about the importance of Conservation of resources, posters are displayed at various important locations emphasizing the importance of Conservation of Resources.

11. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2**into atmosphere.
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** of Electrical Energy /Day
3. Annual Energy Generation Days: For Solar PV Plant:**300 Nos**

12. References:

1. For Indoor Air Quality:www.cpcb.com
2. For Indoor Comfort Parameters:www.ishrae.com
3. For Energy Generated by Solar PV Plant: www.solarrooftop.gov.in
4. For Carbon Sequestration: www.ecomatcher.com
5. For Computation of CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

ADT	:	Art, Design and Technology
MANET	:	Maharashtra Academy of Naval Education & Training
CPCB	:	Central Pollution Control Board
ISHARE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers
AQI	:	Air Quality Index
PM2.5	:	Particulate Matter of Size 2.5 microns
PM 10	:	Particulate Matter of Size 10 microns
kWh	:	kilo-Watt Hour
kWp	:	Kilo Watt Peak
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
MT	:	Metric Ton
LPD	:	Liters Per Day
LPG	:	Liquefied Petroleum Gas

CHAPTER-I
INTRODUCTION

1.1 Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation. *According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment*

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

Table No-1: Relevant Environmental Laws in India:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

Table No-2: Some Important Environmental Rules in India:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

Table No-3: National Environmental Plans & Policy Documents:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

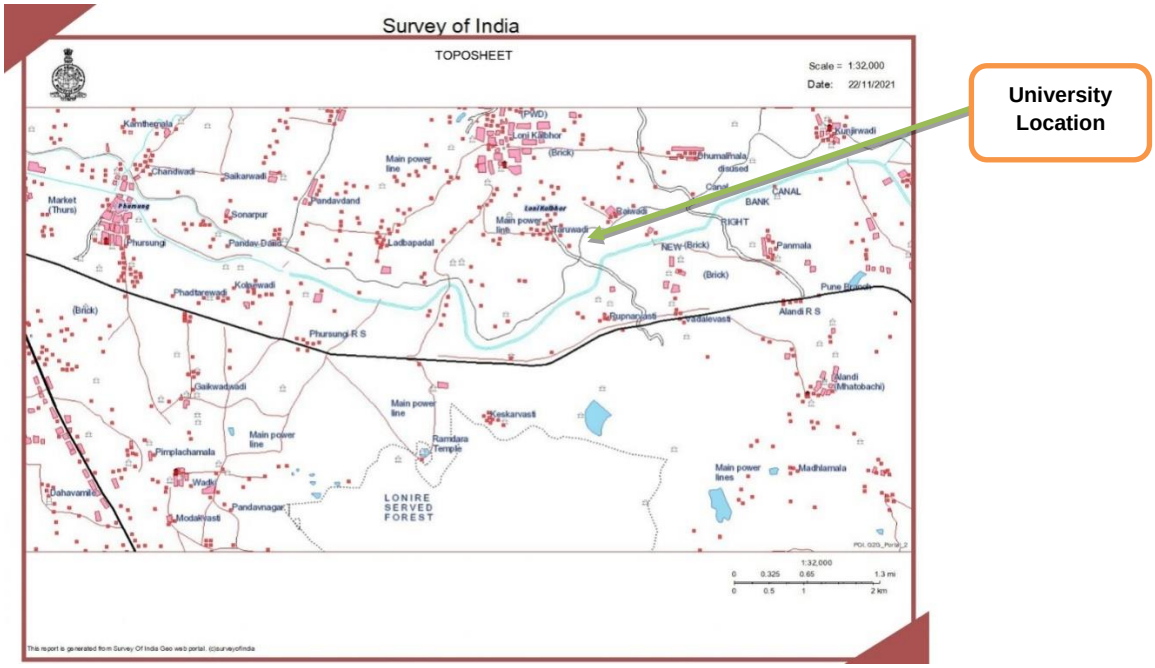
1. To study Consumption of various Resources& CO_2 Emissions
2. To Study Usage of Renewable Energy& CO_2 Emission Reduction
3. To Study Waste Management Practices
4. To Study Rain Water Harvesting
5. To study Eco Friendly Initiatives

1.3 Table No 4: General Details of University:

Table No 4: General Details of University:

No	Head	Particulars
1	Name of Institution	MIT Art Design and Technology University
2	Address	LoniKalbhor, Pune 412 201
3	Latitude / Longitude	18.49^0 / 74.02^0

1.4 Topo Sheet:



1.5 Goggle Earth Image of University:

1.6 List of Buildings:

1. MANET Building
2. MANET- Workshop-1
3. MANET- Workshop-2
4. MANET- Workshop-3
5. MANET- Workshop-4 (T S Vishwanath)
6. MANET Section- Bio Engineering Building
7. MANET Hostel Blocks: A, B, C, D, E, F
8. Design, Architecture & Fine Arts
9. Design College
10. Design Hostel: Boys & Girls
11. School of Film & Television

12. Makers Space
13. Sangeet
14. Vedic Science
15. VC Bungalow, Admission Cell
16. Laundry
17. Raj Kapoor Bungalow
18. Raj Memorial
19. Raj Restaurant& Boat Club Hostel
20. Sports Complex
21. Engineering & I T
22. Workshop- Engineering

CHAPTER-II
STUDY OF CONSUMPTION OF RESOURCES & CO_2 EMISSION

The University consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the Institute System & Environment as under.

Representation of University as a System:

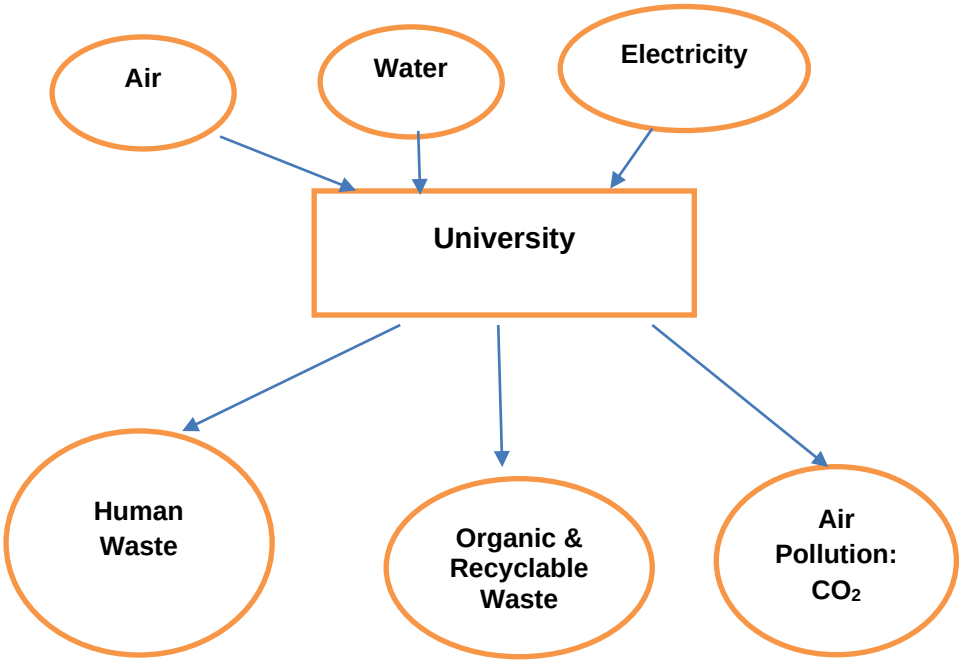


Chart No 1: Representation of University as a System & Environment

2.3 Computation of CO_2 Emissions: A Carbon Foot print is defined as the Total Greenhouse Gas Emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the University for performing its day to day activities. The University uses Electrical Energy for day to day activities.

Basis for computation of CO_2 Emissions:

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 5: Month wise CO_2 Emissions:

No	Month	Electrical Energy Consumed, kWh	LPG Consumed, kg	Diesel Consumed, Liters	CO_2 Emissions, MT
1	Jul-20	69399	1375	250	66.80
2	Aug-20	67738	2071.5	300	67.30
3	Sep-20	58816	2850	450	61.76
4	Oct-20	86078	1596.5	500	83.06
5	Nov-20	55342	2700	250	57.70
6	Dec-20	72633	2510	350	73.02
7	Jan-21	99784	2510	400	97.58
8	Feb-21	110893	2510	450	107.71
9	Mar-21	151684	1596.5	500	142.11
10	Apr-21	86817	1359	650	83.49
11	May-21	60186	900	700	58.42
12	Jun-21	59536	1834	250	59.16
13	Total	978906	23813	5050	958.11
14	Maximum	151684	2850	700	142.11
15	Minimum	55342	900	250	57.70
16	Average	81575.5	1984	421	79.84

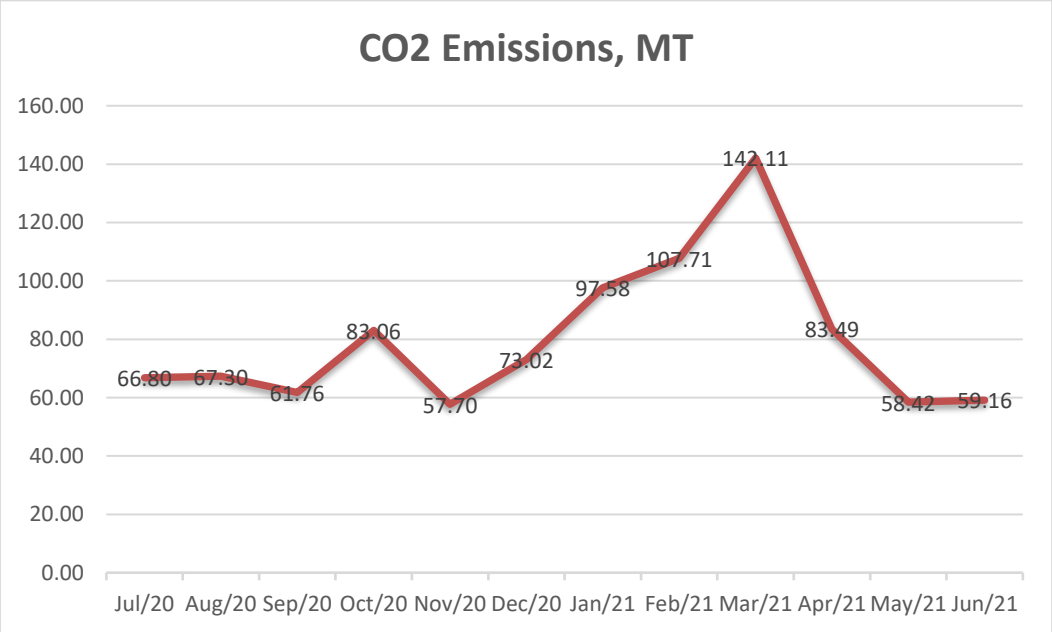


Chart No 2: Representation of Month wise CO_2Emissions:

Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh	LPG Consumed, Kg	Diesel Consumed, Liters	CO_2 Emissions, MT
1	Total	978906	23813	5050	958.11
2	Maximum	151684	2850	700	142.11
3	Minimum	55342	900	250	57.70
4	Average	81575.5	1984	421	79.84

CHAPTER-III
STUDY OF CO_2 EMISSION REDUCTION

The University has installed Roof Top Solar PV Plant as well as Solar Water Heating System on Hostel Blocks.

In the following Table, we present the details of Building wise Solar PV Plants installed and Solar Thermal Water Heating Systems installed.

Table No 7: Details of Building wise Roof Top Solar PV Plants:

No	Location	Solar PV Capacity, kWp
1	MANET Building(Admin Building)	113.4
2	MANET Hostel Block	170.1
3	Boat Club Building	56.7
4	Carpenter Shed	28.4
5	Health Club	56.7
6	Amphi Theatre	56.7
7	SFT Building	138.6
8	I T Building	46.6
9	Bakery Shed	47.5
10	Staff Quarter	17.5
11	**Total**	**732.2**

Table No 8: Details of Solar Thermal Water Heating Systems installed:

No	Location	Capacity in LPD
1	MANET-Hostel- G	6000
2	MANET-Hostel- E	5000
3	MANET-Hostel- F	5000
4	Guest House Building	2500
5	Staff Quarter-1	5000
6	Design College- Girls Hostel	36000
7	Design College- Boys Hostel	18000
8	**Total**	**77500**

In the following Table, we present the percentage of usage of Renewable Energy to Annual Power requirement.

Table No 9: Computation of Reduction in Annual CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Solar PV Plant Capacity	732.2	kWp
2	Average Energy generated per Day	4	kWh
3	Annual Generation Days	300	Nos
4	**Annual Electrical Energy generated by Solar PV Plant**	**878640**	**kWh**
5	1 kWh of Electrical Energy results in CO_2 Emission of	**0.9**	Kg
6	**Annual Reduction in CO_2 Emission = (4) * (5) /1000**	**791**	**MT**

Photograph of Roof Top Solar PV Plant

Photograph of Solar Thermal Water Heating System

CHAPTER IV
STUDY OF INDOOR AIR QUALITY PARAMETERS

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 '**air pollution**' has been defined as **'the presence in the atmosphere of any air pollutant**.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 '**air pollutant**' has been defined as **'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the **AQI** requires an **air monitor** and an **air pollutant** concentration over a specified **averaging period**.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10micron

Table No10: Indoor Air Quality Parameters:

No	Location	A Q I	PM-2.5	PM-10
1	**MANET Building**			
1	Electrical Lab	65	39	44
2	Admission Cell	60	34	38

3	Computer Lab Engineering	55	31	34
4	Placement Cell	31	19	20
5	M.R. office	65	38	48
6	Auditorium	50	31	32
7	ERP Department	45	28	31
8	Human Resource Development Department	95	54	66
9	Innovation, Strategy & Operation	60	36	38
10	Media Department	56	34	36
2	**MANET Workshop-1**	50	30	30
3	**MANET-Workshop-2**	53	38	44
4	**MOL Training Centre**	40	24	24
5	**T. S. Vishwanath**	56	34	32
6	**MANET Section- Bio Engineering**	66	39	51
7	**MANET Hostel Block**	42	25	14
8	**Design, Architecture & Fine Arts**			
4	Ground Floor	30	18	12
2	First Floor	30	18	19
3	Second Floor	58	18	23
4	Third Floor	45	17	26
5	Fourth Floor	44	22	27
9	Design College			
1	Data Centre	15	10	10
2	Faculty Room	33	20	24
3	Computer Lab	21	12	13
4	F-6 (*section-1*)	25	15	16
5	Foundation Studio	23	14	16
6	Faculty Room	33	20	22
7	IT Innovation Programme	23	14	18
8	Drawing Studio	23	14	15

10	Design Hostel Block			
1	Block = 70	45	21	27
2	sports room	45	17	26
3	Block = 10	45	21	28
4	office	30	12	15
11	**School of Film & Television**			
1	admin office	10	4	6
2	fabrication lab	10	7	8
3	Microcontroller & biosensor lab	30	18	26
4	Molecular modelling & simulation lab	30	18	19
5	training center	33	20	20
6	student section	20	12	13
7	editing room 3	31	19	19
8	editing room 4	40	24	34
9	studio room	31	19	19
10	MV seminar hall	40	24	34
11	seminar hall	35	17	24
12	bioinformatics	37	21	28
13	Makers Space			
14	model making studio	40	20	27
15	Studio 2 (A)	41	25	27
16	Studio 3 (P)	40	21	25
17	digital lab	40	24	26
18	sculpture studio	41	23	26
13	**Sangeet**			
1	Office 4	22	18	24
2	Studio 2	20	17	23
3	corridor (domes)	21	13	19
4	Hostel room	30	18	24
5	corridor	21	15	21
6	Statues	22	14	22
7	Ravikiran canteen	23	14	19
8	kitchen	25	15	14

14	**Vedic Science**			
1	science lab	63	36	44
2	staff room	61	37	40
3	Principal/Dean	70	39	46
4	Meeting room	53	31	31
5	S-1	55	34	38
6	seminar hall	41	25	25
15	**VC Bungalow, Admission Cell**			
1	Office 1,2	25	15	20
2	ICT office	26	16	19
3	H104	20	12	12
4	H105	20	12	19
5	H-201	21	13	15
6	H-206	11	9	14
16	**Laundry**	23	14	24
17	**Raj Kapoor Bungalow**	26	15	16
18	**Raj Memorial**	23	14	15
19	**Raj Restaurant & Boat Club Block**			
	Raj restaurant	33	20	24
	Boat club hostel	33	20	25
20	**Sports Complex**			
1	Indoor games	25	17	18
2	steam bath	23	14	14
3	badminton court	27	18	19
21	**Engineering & I T**			
1	Survey lab	35	21	27
2	Applied mechanics	36	22	30
3	N 101	36	22	26
4	N 102	40	25	24
5	N 204	36	22	26

6	N 205	50	30	32
7	Reading hall	31	19	22
8	Library	40	22	31
9	N 410	30	18	20
10	comp lab	27	16	20
11	501	26	17	20
12	502	24	16	20
13	607	23	15	20
14	608	35	25	21
15	710	33	21	25
16	Faculty room	25	16	26
17	808	25	16	19
18	809	24	15	18
22	**Workshop-Engineering**			
1	workshop	30	18	15
2	food tech lab	30	18	19
23	**Maximum**	**95**	**54**	**66**
24	**Minimum**	**10**	**4**	**6**

CHAPTER V
STUDY OF INDDOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit.

The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No11: Study of Indoor Comfort Parameters:

No	Location	Lux Level, Lumen	Noise Level, Max.	Noise Level, Min.	Temperature, ^0C	Humidity, %
1	**MANET Building**					
1	Electrical Lab	63	74.4	55	23.7	92
2	Admission Cell	168	71.6	54.4	23.2	98
3	Computer Lab Engineering	83	66.1	53.1	24	80
4	Placement Cell	147	78	45.5	25.6	74
5	M.R. office	350	60.3	51.3	25.5	99
6	Auditorium	369	51.2	43.3	25.3	86
7	ERP Department	206	65.6	49.9	25.6	83
8	Human Resource Development Department	636	68.3	57.7	26.3	85
9	Innovation, Strategy & Operation	382	69.9	55	25.9	84
10	Media Department	465	64.2	60.3	26	84
2	**MANET Workshop-1**	13	70.2	52.2	25.4	90
3	**MANET-Workshop-2**	27	57.1	49.9	25.9	88
4	**MOL Training Centre**	199	55.5	45.2	26	89
5	**T. S. Vishwanath**	79	75.4	60	25	93
6	**MANET Section- Bio Engineering**	135	74.3	62	26	55
7	**MANET Hostel Block**	105	49.3	42.3	22.1	91

8	**Design, Architecture & Fine Arts**					
1	Ground Floor	96	45.5	41.2	22.3	91
2	First Floor	100	46.4	42.1	22.1	92
3	Second Floor	105	40.2	38.5	22.3	90
4	Third Floor	120	45.2	38.3	22	91
5	Fourth Floor	94	50.7	48.3	22.2	89
9	**Design College**					
1	Data Centre	146	65.6	53.6	21.2	71
2	Faculty Room	162	65.6	53.6	24.5	87
3	Computer Lab	122	67.1	52.3	20	73
4	F-6 (*section-1*)	132	70.2	47.3	28	76
5	Foundation Studio	62	76.4	60	27.9	74
6	Faculty Room	66	66.6	55	28.1	77
7	IT Innovation Programme	198	83.8	69.1	28.3	80
8	Drawing Studio	81	70	61.9	28.3	60
10	**Design Hostel Block**					
1	Block = 70	165	71.7	56.2	22	92
2	sports room	120	45.2	38.3	22	91
3	Block = 10	160	72	55.2	23	91
4	office	190	75	55	24.2	70
11	**School of Film & Television**					
1	Admin office	130	67.2	52.1	25.6	86
2	fabrication lab	234	62.7	47.5	25.7	84
3	Microcontroller & biosensor lab	196	73.5	56.4	25	84
4	Molecular modeling &simulation lab	87	64.8	59.8	25.2	84
5	training center	220	76.4	47.9	25.1	86
6	student section	184	65	51.8	25	88
7	editing room 3	23	61.6	52.5	25.5	83
8	editing room 4	127	82.4	63.8	25.3	86
9	studio room	232	58.6	50.9	24.9	85
10	MV seminar hall	101	52.5	44.2	24.9	85
11	seminar hall	260	68	59.1	25.9	83
12	bioinformatics	170	53.5	51.3	25.9	82
12	**Makers Space**					

1	model making studio	230	67.4	51.9	24.5	94
2	Studio 2 (A)	221	65.5	54.6	24.8	87
3	Studio 3 (P)	189	69	61.5	25	88
4	digital lab	91	74.1	61.6	24.9	87
5	sculpture studio	154	65.1	60.4		
13	**Sangeet**					
1	Office 4	153	58.1	53.2	25	78
2	Studio 2	190	59.1	58.1	24	79
3	corridor (domes)	162	55.1	53.2	24.3	80
4	Hostel room	150	55.5	50.1	24.5	79
5	corridor	151	54.8	51.2	24.8	77
6	Statues	150	53.1	50.2	25	76
7	Ravikiran canteen	152	55.2	52.8	25	75
8	kitchen	60	78	68.9	27	71
14	**Vedic Science**					
1	science lab	138	71.6	55.6	24	91
2	staff room	179	64	58	24	89
3	Principal/Dean	150	66.8	48.3	25.5	84
4	Meeting room	135	61.7	51.3	25.6	84
5	S-1	354	57.1	51.1	27.1	79
6	seminar hall	327	58.2	50.2	26.9	79
15	**VC Bungalow, Admission Cell**					
1	Office 1,2	190	49.6	42.9	26	75
2	ICT office	185	50.1	43.7	26	75
3	H104	262	75.2	54.7	26	75
4	H105	222	56.5	54.2	26.2	72
5	H-201	230	57.2	56.1	26.2	73
6	H-206	180	65.6	57.2	26	75
16	**Laundry**	131	70.8	56.4	26.1	88
17	**Raj Kapoor Bungalow**	150	74.3	59.3	24	92
18	**Raj Memorial**	102	70.2	50.1	25.6	80
19	**Raj Restaurant & Boat Club**					

	Block					
1	Raj restaurant	600	67.7	55.2	23.7	82
2	Boat club hostel	100	55.5	51.7	23.9	86
20	**Sports Complex**					
1	Indoor games	131	51.5	50.4	25.3	75
2	steam bath	185	62	45	25	77
3	badminton court	166	64.2	47.6	24.6	85
21	**Engineering & I T**					
1	Survey lab	107	71.5	61	22.6	92
2	Applied mechanics	78	65.5	64.5	22.6	93
3	N 101	129	67.5	57.3	24.5	86
4	N 102	138	66.5	51.3	24.3	87
5	N 204	206	67.5	62.2	24.6	85
6	N 205	190	69.5	53.3	24.7	85
7	Reading hall	215	71.6	66.5	27.3	75
8	Library	496	73.5	52.6	26.9	78
9	N 410	120	62	52.1	26	90
10	comp lab	156	156	73	33	81
11	501	272	67	60	26	78
12	502	144	76	58	26	79
13	607	154	60.1	55.3	26	75
14	608	161	61.2	54	27	77
15	710	170	71.7	67	26	80
16	Faculty room	450	61.4	52.5	26	81
17	808	210	58.2	134.1	26	81
18	809	201	50	125.5	26	77
22	**Workshop-Engineering**					
1	workshop	37	64.3	50	25.5	84
2	food tech lab	20	55.1	42.3	24	86
23	**Maximum**	636	156	134.1	33	99
24	**Minimum**	13	40.2	38.3	20	55

CHAPTER VI
ESTIMATIONOF WATER CONSUMPTION

In this Chapter, we present the estimation of Water Consumed.

6.1 Study of Single Line Diagram of Water Distribution:

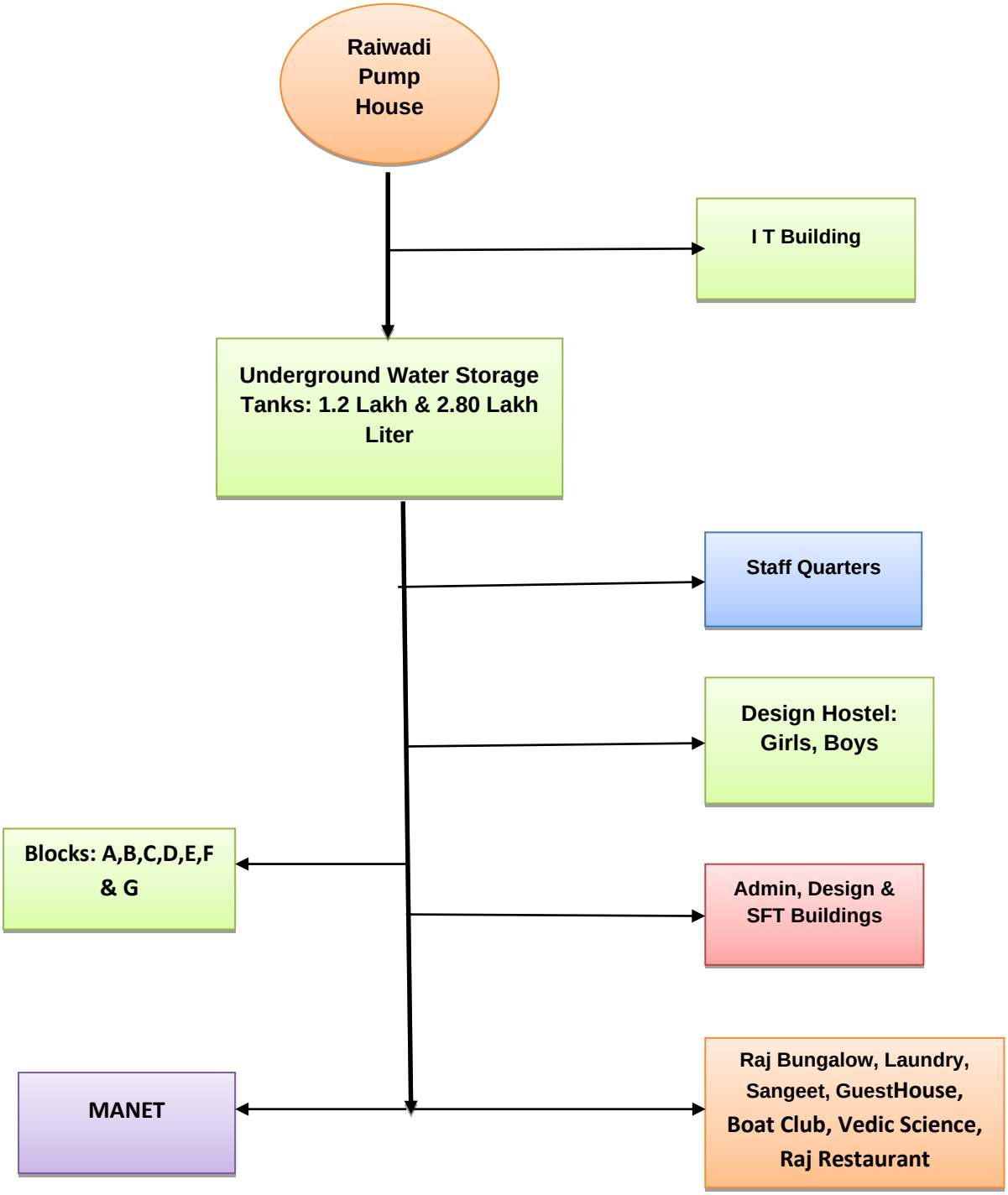


Chart No 3: Single Line Diagram of Water Distribution

6.2 Brief Description of Water Distribution System:

1.The University has own well located at Raiwadi, about 5.5 kms away from the main campus, in the LoniKalbhor Village. From this Raiwadi well, the Water is pumped to the main campus. There are two Submersible Water pumps at the Raiwadi Well section, of 10 HP and 15 each, which pump the water to main campus.

2.In the Campus there are two underground RCC Water Storage tanks, of capacities 1.2 Lakh Liters and 2.8 Lakh Liters. The 1.2 Lakh Liter Tank is used for Drinking purpose, while the 2.8 Lakh Liter Tank is used for Domestic purpose.

3. The main Water Filter Plant is near the Underground Water Tank. There is also a Filtration Plant at MANET Hostel Terrace.

4.There are two Dug Wells in the campus, namely located at:

1. Near Guest House
2. Near Design Hostel

5.There are three bore wells, namely at:

1. MANET Hostel Canteen block
2. I T Building
3. Design Hostel Block

6.3 Details of Building wise Overhead Water Storage Tanks:

Table No 12: List of Overhead Water Tanks:

No	Location	Capacity, Liters	Qty	Total Capacity, Liters
1	Sangeet	7000	4	28000
2	Guest House	12000	1	12000
3	Guest House	21000	1	21000
4	Guest House	2000	2	4000
5	Boat Club- U/G	30000	1	30000
6	Raj Bungalow	1000	2	2000
7	Girls Hostel- Design	20000	2	40000
8	Boys Hostel- Design	5000	10	50000
9	Raj Restaurant	12000	2	24000
10	Raj Restaurant	15000	1	15000
11	Raj Restaurant	5000	1	5000
12	Admin Building	10000	1	10000
13	Admin Building	25000	1	25000
14	Design College Building	3000	4	12000
15	SFT Building	25000	3	75000
16	MANET Building	10000	4	40000

17	Block-A,B,C	10000	1	10000
18	Block-A,B,C	5000	1	5000
19	Block- D,F	10000	1	10000
20	Block- D,F	5000	1	5000
21	Terrace	10000	2	20000
22	Hostel- G Block-1	9000	1	9000
23	Hostel- G Block-2	5000	1	5000
24	Hostel- A,B,C,D, E, F	38000	1	38000
25	Hostel- A,B,C,D, E, F	6000	1	6000
26	I T Building-1	49000	1	49000
27	I T Building-2	42000	1	42000
28	I T Building-3	40000	1	40000
29	**Total**			**632000**

6.4 Details of Water Pumps:

Table No 13: List of Water Distribution Pumps:

No	Location	Capacity, H P	Qty
1	Raiwadi	15	1
2	Raiwadi	10	1
3	R O Plant-1	7.5	1
4	R O Plant-2	5	1
5	Design Hostel-Girls	5	1
6	Design Hostel-Boys	5	1
7	Design College	2	2
8	Admin Building	3	1
9	SFT Building	5	1
10	I T Building-1	7.5	2
11	I T Building-2	7.5	2
12	Raj Restaurant	2	2
13	Raj Bungalow	2	1
14	Guest House	2	2
15	Sangeet	2	2
16	MANET	5	2
17	Blocks-A,B,C	2	2
18	Dug Well- Guest House	5	1
19	Dug Well- Design	5	1
20	Bore well- Design	2	4

6.5Study of Water Consumers:

Table No 14: Approximate Quantification of Water Consumers:

No	Section	No of Users
1	MANET	1200
2	Design, Fine Arts	750
3	Film, Drama	1200
4	Sangeet	500
5	Vedic Science	500
6	Staff Quarter-New	400
7	Design Hostel- Girls	400
8	Design Hostel- Boys	400
9	Hostel-MANET	1200
10	Hostel- Boat Club	200
11	Staff Quarter-III	400
12	I T Section	2800
13	Staff Members	700
14	Outside Visitors	150
15	**Total**	**10650**

6.6 Computation of Water Consumption:

6.6.1 Approach-1: For computation of Water Consumption, field survey was conducted. At each building, in how much time it takes the Water Tank to fill up time was studied, with the help of the respective section pump operators. The pump operation is fully automatic. As soon as the Water level falls the preset value, the pump starts pumping the Water into the overhead tank. The frequency of Tank filling up time was studied. We present the Data for Tank Filling up time as under.

Table No 15: Study of Tank Filling Up Frequency & Computation of Daily Water Consumption:

No	Location	Total Capacity, Liters	Filling Time, Day	Consumption, Liters/Day
1	Sangeet	28000	2	14000
2	Guest House	12000	2	6000
3	Guest House	21000	2	10500
4	Guest House	4000	2	2000
5	Boat Club- U/G	30000	1	30000
6	Raj Bungalow	2000	1	2000
7	Girls Hostel- Design	40000	1	40000
8	Boys Hostel- Design	50000	1	50000
9	Raj Restaurant	24000	2	12000
10	Raj Restaurant	15000	2	7500

11	Admin Building	10000	2	5000
12	Admin Building	25000	1	25000
13	Design College Building	12000	1	12000
14	SFT Building	75000	1.5	50000
15	MANET Building	40000	1	40000
16	Block-A,B,C	10000	1	10000
17	Block-A,B,C	5000	1	5000
18	Block- D,F	10000	1	10000
19	Block- D,F	5000	1	5000
20	Terrace	20000	2	10000
21	Hostel- G Block-1	9000	1	9000
22	Hostel- G Block-2	5000	1	5000
23	Hostel- A,B,C,D, E, F	38000	2	19000
24	Hostel- A,B,C,D, E, F	6000	2	3000
25	I T Building-1	49000	1	49000
26	I T Building-2	42000	1	42000
27	I T Building-3	40000	1	40000
28				**513000**

6.6.2 Approach-2: In this Method we estimate the Water consumption, taking into account the Water consumed per person per day basis. There are two categories of consumers, namely Hostel occupants and Non-hostel students and staff members. For Hostel students, we assume consumption to be: 130 Liters/per person/Per Day. For Non- Hostel users, we assume consumption to be: 30 Liters/per person/Per Day.

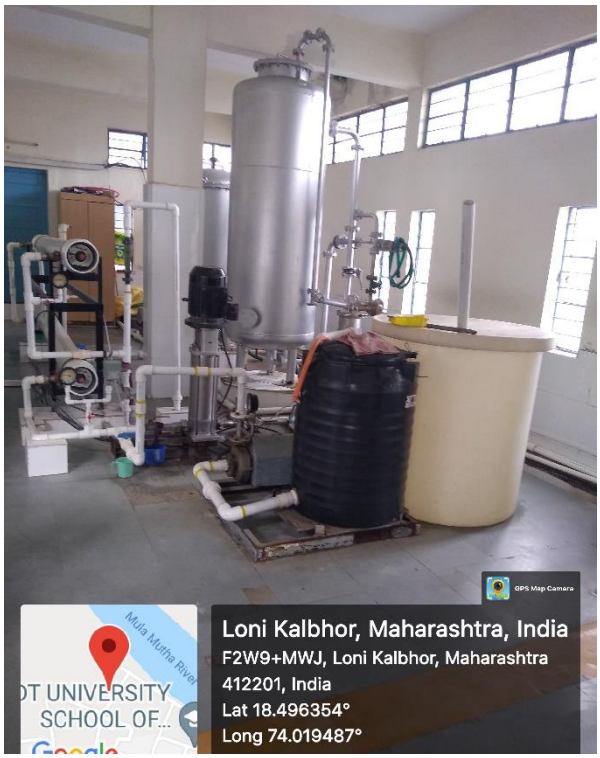
Table No 16: Water Consumption Estimation: Per Person per Day basis:

No	Section	No of Users	Water Con, Liters
1	MANET	1200	36000
2	Design, Fine Arts	750	22500
3	Film, Drama	1200	36000
4	Sangeet	500	15000
5	Vedic Science	500	15000
6	Staff Quarter-New	400	12000
7	Design Hostel- Girls	400	52000
8	Design Hostel- Boys	400	52000
9	Hostel-MANET	1200	156000
10	Hostel- Boat Club	200	6000
11	Staff Quarter-III	400	12000
12	I T Section	2800	84000
13	Staff Members	700	21000
14	**Total**	**10650**	**519500**

6.6.3 Estimation of Daily Water Consumption:

From the above analysis, we arrive at the conclusion that the Average Daily Water Consumption is (513000+519500) / 2 = **516250 liters/Day.**

Photograph of Main Well at Raiwadi:



Photograph of Water Filtration Plant

CHAPTER VII
STUDY OF WASTE MANAGEMENT

7.1 Recyclable/Solid Waste Management:

This includes: paper waste, card board waste, plastic waste and other recyclable waste generated in day to day operations. At important locations, Waste collections Bins are placed in order to segregate the Waste at source. The University has dedicated House Keeping Department.

Photograph of Waste Collection Bins near MANET Hostel Block

7.2 Bio-Degradable / Organic Waste:

The University has installed Organic Waste Converter to convert the Bio Degradable / Organic Waste into Bio fertilizer. This is either sold to adjacent farmers and or used in the own garden.

Photograph of Organic Waste Converter

7.3 Liquid Waste Management:

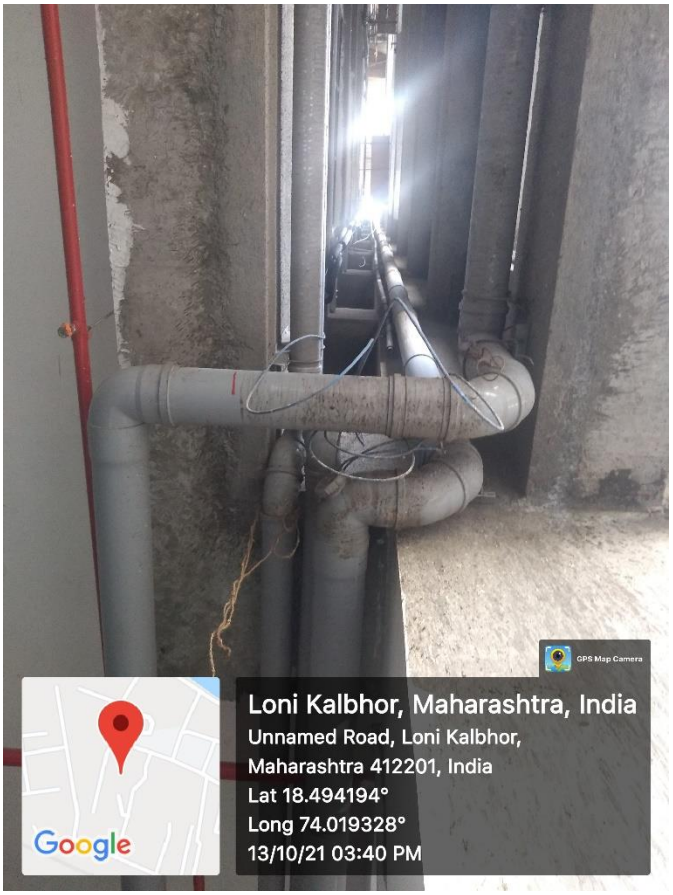
The University is in a process of installing Sewage Treatment Plant near the Staff Quarter.

7.4 E-Waste Management:

It is recommended to dispose of the E-Waste generated through Authorized Vendors.

CHAPTER VIII
STUDY OF RAIN WATER HARVESTING

The University has installed Rain Water Harvesting project at the Engineering& I T Building. The University is conducting to install the Rain Water Harvesting Project on all the Buildings in the premises.



Photograph of Rain Water Harvesting Project at IT Building

CHAPTER IX
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

9.1 Creation of Awareness about Resource Conservation:

To make aware about the importance of Conservation of resources, Display posters emphasizing the importance of Resource conservation are placed at various important locations.

Photograph of Display Poster about awareness of Energy Conservation

9.2 Usage of Battery Operated Vehicles:

The University is making use of Battery Operated Vehicles for transportation in the campus.

Photograph of Battery Operated Vehicle

CHAPTER X
STUDY OF CARBON SEQUESTRATION

A key "feature" of a tree is that trees sequester carbon: The process of removal and long-term storage of carbon dioxide (CO_2) from our atmosphere.

Step 1: Determination of the total green weight of the tree:

The green weight is the weight of the tree when it is alive. First, you have to calculate the green weight of the above-ground weight as follows:

$W_{above\text{-}ground} = 0.25\ D^2\ H$ (for trees with D<11)
$W_{above\text{-}ground} = 0.15\ D^2\ H$ (for trees with D>11)
Where, $W_{above\text{-}ground}$ = Above-ground weight in pounds

Where, D = Diameter of the trunk andH = Height of the tree in feet

The root system weight is about 20% of the above-ground weight. Therefore, to determine the total green weight of the tree, multiply the above-ground weight by 1.2

$$W_{total\ green\ weight} = 1.2 * W_{above\text{-}ground}$$

Step 2: Determination of the dry weight of the tree:
The average tree is 72.5% dry matter and 27.5% moisture. Therefore, to determine the dry weight of the tree, multiply the total green weight of the tree by 72.5%.

$$W_{dry\ weight} = 0.725 * W_{total\ green\ weight}$$

Step 3: Determination of the weight of carbon in the tree
The average carbon content is generally 50% of the tree's dry weight total volume. Therefore, in determining the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

$$W_{carbon} = 0.5 * W_{dry\ weight}$$

Step 4: Determination of the weight of carbon dioxide sequestered in the tree:
CO_2 has one molecule of Carbon and 2 molecules of Oxygen. The atomic weight of Carbon is 12 (u) and the atomic weight of Oxygen is 16 (u). The weight of CO2 in trees is determined by the ratio of CO2 to C is 44/12 = **3.67**. Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by **3.67**.

$$W_{carbon\text{-}dioxide} = 3.67 * W_{carbon}$$

Table No 17: Computation of Sequestrated Carbon:

No	Name of Tree	Diameter, Ft.	Height, in Ft.	Wabove ground, Kg	Total Green Weight, Kg	W-Dry Weight	Wcarbon, Kg	W-CO2, Kg	Qty	Total, W-CO2, MT
1	Azaadirachtaindica	2.832	55	66.2	79.4	57.6	28.8	105.6	100	10.6
2	Archontophoenixcunninghamiana	3.77	49	104.8	125.8	91.2	45.6	167.3	1006	168.3
3	Acerengundo	1.36	65	18.0	21.6	15.7	7.8	28.8	61	1.8
4	Albizialebbeck	2.832	72	86.6	103.9	75.4	37.7	138.3	530	73.3
5	Bambusa vulgaris	11.96	49	1052.8	1263.3	915.9	458.0	1680.7	56	94.1
6	Cocosnucifera	2.512	85	80.5	96.5	70.0	35.0	128.4	250	32.1
7	Casuarinacunninghamiana	2.512	98	92.8	111.3	80.7	40.4	148.1	15	2.2
8	Deolonixregia	4.72	16	53.5	64.2	46.5	23.3	85.4	235	20.1
9	Dypsislutesens	0.078	27	0.0	0.0	0.0	0.0	0.0	510	0.0
10	Ficusreligiosa	8	82	787.2	944.6	684.9	342.4	1256.7	20	25.1
11	Ficusglomerata	4.784	45	154.5	185.4	134.4	67.2	246.6	10	2.5
12	Latanialontaroides	2.832	118	142.0	170.3	123.5	61.8	226.6	40	9.1
13	Millingtoniahortensis	1.92	72	39.8	47.8	34.6	17.3	63.6	60	3.8
14	Nerium oleander L	2.8	18	21.2	25.4	18.4	9.2	33.8	140	4.7
15	Peltophorumpterocarpum	2.4	82	70.8	85.0	61.6	30.8	113.1	16	1.8
16	Phoenix dactylifera	3.14	82	121.6	145.9	105.8	52.9	194.1	20	3.9
17	Sphothod	2.64	45	47.0	56.5	40.9	20.5	75.1	25	1.9

	eacampa nulata									
18	Saracaas oca	2.39	29.5	25.3	30.4	22.0	11.0	40.4	360	14.6
19	Tamarind indica	4.72	72.1	240.9	289.1	209.6	104.8	384.7	35	13.5
20	**Total**			**3205.4**	**3846.5**	**2788.7**	**1394.4**	**5117.3**	**3489**	**483.2**

ANNEXURE-I:
WATER ANALYSIS REPORT

MIT SCHOOL OF ENGINEERING

MIT-ADT UNIVERSITY
PUNE, INDIA

DEPARTMENT OF CIVIL ENGINEERING

Outward No.- MITSOE/CED/MTC/2021-22/08/11 23/08/2021

To,
The Principal,
MIT School of Engineering,
Pune

Ref:

Subject: Testing of Drinking Water Sample
Name of Work: Testing of Cooler Water of IT building.
Name of Agency/Contractor: MIT SOE, MIT ADT University, Pune

Date of Sampling:	30/07/2021
Start Date of Analysis:	02/08/2021
End Date of Analysis:	20/08/2021
Sample Detail:	Fourth Floor Cooler Water
Nature of sample:	Liquid

Water Analysis Report

Sr. No.	Parameter	Unit	Result	Limits as per IS 10500:2012	Analysis Method
1	Colour	Hezen	Clear	5.00	IS: 3025 (part 4)
2	pH	--	6.90	6.5-8.5	IS: 3025 (part 11)
3	TDS	mg/lit	31.00	<500	IS: 3025 (part 16)
4	Turbidity	NTU	0	<1.00	IS: 3025 (part 10)
5	BOD_5	mg/lit	0	Not Specified	IS: 3025 (part 44)
6	TSS	mg/lit	0	Not Specified	IS: 3025 (part 17)
7	Total Hardness a CaCo3	mg/lit	32.00	<200.00	IS: 3025 (part 21)
8	Chloride as Cl^-	mg/lit	7.50	<250.00	IS: 3025 (part 32)
9	Fluorides as F^-	mg/lit	1.00	1.00	IS: 3025 (part 60)
10	Iron as Fe	mg/lit	0	<0.30	IS: 3025 (part 53)
11	Total Coli form	No./100ml	Absent	Absent	IS: 1622 (Rev.1, R.A:2014)

Terns & Conditions

1. The report is refer only to the sample tested and not applied to the bulk
2. The results shown in this test report may differ based on various factor including temperature, humidity, pressure, retentation time etc.
3. Testing charges deposited through challan/receipt no. _____

Testing In charge
Prof. Amit S. Dharnaik

HOD
Prof. Dr. Satish B. Patil

--End of Report--

Rajbaug, Next to Hadapsar, Loni Kalbhor, Pune 412 201, India.
Contact : +91 20 26912901 / 02 / 03, +91 9021 080 109 | Email: admissions@mituniversity.edu.in | www.mituniversity.edu.i

ANNEXURE-II:VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between **6.5 to 8.5** Dissolved Oxygen **6 mg/l or more**
2	Drinking water source after conventional treatment and disinfection	pH between **6 to 9** Dissolved Oxygen **4 mg/l or more**
3	Outdoor Bathing (Organized)	pH between **6.5 to 8.5** Dissolved Oxygen **5 mg/l or more**
4	Controlled Waste Disposal	pH between **6 to 8.5**

3. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

4. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33^0C
2	Humidity	Less Than 70%