



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

**SCHOOL OF BUILDING AND
ENVIRONMENT DEPARTMENT OF
ARCHITECTURE**

M. Arch (Sustainable Architecture)

**PROFESSIONAL TRAINING REPORT
(S89APT) JUL 2022 - AUG 2022**

Name of the Student :G.ABHINAYA

Reg No. : 41890002

Semester : III

Batch : 2021-2023



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SCHOOL OF BUILDING AND ENVIRONMENT DEPARTMENT OF ARCHITECTURE

VIVA-VOCE EXAMINATION

This is to certify that the Professional Training Report (S89APT) is the work of **G.ABHINAYA / 41890002** who had undergone training in **EARTHONOMICS ENGINEERS** and has been monitored by the continuous assessment during Jul 2022 to Aug 2022.

Dr. Devyani Gangopadhyay
HOD AND DEAN

Submitted for Viva voce Examination held on: 22 Dec 2022

Internal Examiner

External Examiner



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DECLARATION

I **G.ABHINAYA** hereby declare that this Professional Training Report **11 JULY 2022-19 AUGUST 2022** done by me under the guidance of **Er.GIRISH VISHWANATHAN** is submitted in partial fulfillment of the requirements for the completion of practical training session.



DATE : 20 December 2022

PLACE : Chennai

scanned sign

SIGNATURE OF CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of **SATHYABAMA INSTITUTE OF SCIENCE & TECHNOLOGY** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. Devyani Gangopadhyay Dean, School of building and Environment** for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to **Ar .Aravind Balaji** for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of my Training.

I would also like to express my sincere thanks to **Ar. Catherine Selvaraj** (Internal Co-ordinator) for her valuable guidance, during the entire Professional Training period.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Architecture who were helpful in many ways for the completion of the project.

I would like to express my thanks to **my family and my husband** for constant encouragement

I also thank **Mr. GISRISH Vishwanathan** for providing an opportunity to understand new concepts in sustainability through internship at the **Earthonomics Engineers**

JOINING LETTER

Earthonomic Engineers Private Limited
Registered office: F2 Ashok Castle,
47, 12th Avenue Ashok Nagar, Chennai – 600083
Email: info@earthonomic.com
GSTIN: 33AAFCE2933A1ZA



11th July 2022

Dear Abhinaya G,

We are very pleased to offer you an internship program with
EARTHONOMIC ENGINEERS PVT LTD from 11th July 2022 to 19th August
2022.

Your responsibilities will be directed to you by your reporting
manager.

Kindly note that any information and data collected from you during
the course of your internship should be kept confidential at all times.

Yours sincerely,

Girish.R.Viswanathan
Director-TECHNICAL



www.earthonomic.com

CONFIRMATION LETTER

Earthonomic Engineers Private Limited
Registered office: F2 Ashok Castle,
47, 12th Avenue Ashok Nagar, Chennai – 600083
Email: info@earthonomic.com
GSTIN: 33AAFCE2933A1ZA



19th August 2022

CONFIRMATION LETTER

To

The Head of the Department,

Sathyabama Institute of Science and Technology

Rajiv Gandhi Salai, Jeppiaar Nagar,

Chennai - 600119,

Tamil Nadu

Subject: Trainee Confirmation for 11th July 2022 to 19th August 2022

Respected Madam,

I **GIRISH. R. VISVANATHAN** accept Abhinaya. G bearing reg.no 41850002 Pursuing
3rd semester M. Arch Department of Architecture in Sathyabama Institute of Science and
Technology as an intern and confirm her internship program with us for the period
between (11th July 2022 to 19th August 2022).

Regards and Thanks,



GIRISH. R. VISVANATHAN

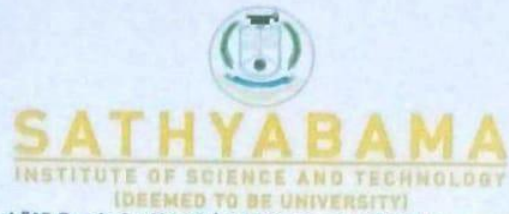
(Director - Technical)

Earthonomic Engineers Private Limited

Adyar, Chennai – 600020

www.earthonomic.com

MONTHLY REPORT



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SCHOOL OF BUILDING & ENVIRONMENT, DEPARTMENT OF ARCHITECTURE M. Arch (Sustainable Architecture) Batch 2021-2023 Continuous Assessment Report for Professional training

(Continuous progress report of the trainee architect/Project Manager for the period of 15 working days in the office to be submitted to HOD)

1. Name of the office / organization :	Earthnomic Engineers
2. Address & Contact Number :	Parameshwari Nagar, Adyar (0637911440)
3. Name of the student :	G. Abhiraya
4. Duration :	From 11 th July To 30 th July
5. Total No. of days :	15 days
6. Evaluation of Performance criteria shall be on	

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month;

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture	✓				
Skillsets related to project management		✓			
Design Management	✓				
Understanding the Triple Constraints	✓				
Observation during Site Visits			X		
Understanding of construction details	✓				
Understanding of Construction sequences	✓				
Site Supervision / Discussion with clients	✓				
Adherence to Time schedule	✓				
Quantitative aptitude		✓			
Documentation skills	✓				
Coordination with other consultants	✓				

Overall Grading*

"A"

(A - 8.0, B - 7.0, C - 6.0, D - 5.5, E - 5.0, F - <5)

7. Any other Remarks : Good Contribution in the given works.

8. Signature of the Head of the Office / Organization (With Seal)

[Signature]



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SCHOOL OF BUILDING & ENVIRONMENT, DEPARTMENT OF ARCHITECTURE M. Arch (Sustainable Architecture) Batch 2021-2023 Continuous Assessment Report for Professional training

(Continuous progress report of the trainee architect/Project Manager for the period of 15 working days in the office to be submitted to HOD)

1. Name of the office / organization :	Earthnomic Engineers
2. Address & Contact Number :	Parameshwari Nagar, Adyar (0637911440)
3. Name of the student :	G. Abhiraya
4. Duration :	From 1 st August To 17 th August
5. Total No. of days :	15 days
6. Evaluation of Performance criteria shall be on	

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month;

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture	✓				
Skillsets related to project management		✓			
Design Management	✓				
Understanding the Triple Constraints	✓				
Observation during Site Visits			X		
Understanding of construction details	✓				
Understanding of Construction sequences		✓			
Site Supervision / Discussion with clients	✓				
Adherence to Time schedule	✓				
Quantitative aptitude		✓			
Documentation skills	✓				
Coordination with other consultants	✓				

Overall Grading*

"A"

(A - 8.0, B - 7.0, C - 6.0, D - 5.5, E - 5.0, F - <5)

7. Any other Remarks : Student with good communication skills, completed all the given works on time.

8. Signature of the Head of the Office / Organization (With Seal)

[Signature]

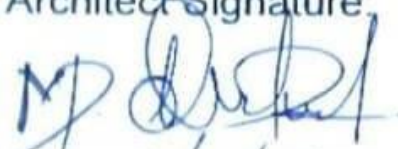


WORK DIARY

WORK DIARY

DAY	PROJECT NAME	WORK DONE	DAY	PROJECT NAME	WORK DONE
1	IGBC	Understanding IGBC certification and its process	14	DATA CENTRE @ HYDERABAD	Data segregation (Documents Required & Reviewed)
2	APARTMENT @ HYDERABAD	Analysis of the plan (worst case scenario)	15	"	Understanding IGBC certification
3	"	IGBC Daylight credit - Lygreen homes	16	"	calculations, Area statement
4	"	Day light calculations	17	"	water balance chart
5	"	Design builder model for 5 units	18	"	Rainwater harvesting calculation
6	"	Design builder model for 5 units	19	"	water fixture calculations
7	"	Daylight Report (presentation)	20	"	Lighting fixture, LPO, ventilation calculation
8	Railway guest house	IESVE - sketchup model	21	"	Lis of specus, AC, U value calculations
9	Assignment	Solar, lighting and energy calculations	22	"	segregating Data reviewed into folders
10	Karmanghat Lygreen home	IESVE Ventilation model	23	"	marking Documents Reviewed in Excel sheet
11	"	Ventilation (CFD) simulation	24	"	IESVE Model Ground floor
12	"	CFD Analysis and Report	25	Greenfactory @ Oragadam (office building)	IGBC certification credit 1 & 2 (Report)
13	"	"	26	"	Report for IGBC credits (Air quality, site, water, waste) concept, photoshop, landscape plan
					Presentation (Ideology)

Chief Architect Signature:


19/08/2022

Office seal:

Earthonomic Engineers Pvt. Ltd.
Old No. 47, New No. 41,
F2 Ashok Castle, 12th Avenue,
Ashok Nagar, Chennai-600 083.

WORK DIARY

[illegible]

Chief Architect Signature:

19/01/2012

Consolidated Certificate (Experience)

Earthonomic Engineers Private Limited
Registered office: F2 Ashok Castle,
47, 12th Avenue Ashok Nagar, Chennai – 600 083
Email: info@earthonomic.com
GSTIN: 33AAFCE2933A12A

19th August 2022

Consolidated Certificate (Experience)

To,
The Head of the Department
Sathyabama institute of science and technology,
Rajiv Gandhi Salai,
Jeppiaar Nagar,
Chennai -600019.

Subject: Successful completion of 1 month long professional training.

Respected Madam,

This is to certify that 'Abhinaya.G' bearing reg. No 41890002 of 3rd semester M. Arch (SA), Department of Architecture in Sathyabama institute of science and technology, has successfully completed 1-month long professional training by working in our office "Earthnomic Engineers". She was associated as a trainee for the period between (11th July 2022 to 19th August 2022).

She excelled in her work as an intern in "Earthnomic engineers, Adyar, Chennai," during his period work.

Regards and Thanks,



GIRISH, R. VISVANATHAN

(Director - Technical)

Earthnomic Engineers Private Limited

Adyar, Chennai – 600020

www.earthsonomic.com

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INTRODUCTION : EARTHONOMICS ENGINEERS

- Earthonomics, works towards developing sustainable environments for homes and organizations. The primary aim is to provide the best options for sustainable living by creating high performance environments for everyone.
- The services provided are built to meet the demands of individual projects as well as to integrate sustainability into a company's ongoing operations.
- **The main focus is on every project's sustainability goals, not just its scorecard.**
- Utilizing our experience and broad access of experts and industry best practices, we efficiently assist companies and individuals achieve or exceed their desired expectation



WORK SCOPE OF THE COMPANY



STAKE HOLDERS IN THE COMPANY

Corporates And MNCs

As an extended arm bringing green strategy, roadmaps, green facilitation services, training, and tools.

Architects

Augment and quantify designs to ensure health, energy efficiency and ROI

Developers

Design intervention, analysis, and certification

MEP Consultants

Technology selection, HVAC sizing analysis, and commissioning

Educational Institutions

Capacity building, green audit, campus audit, accreditations, and certifications

Home And Farmland Owners

Climate based data analytics for sustainable cropping and passive farmhouse designs

CLIENTS AND PARTNERS



PROJECT 1

Multilevel housing @ Hyderabad

TYPOLOGY : Residential

AREA : 2.2 acres

LOCATION : Karmanghat, Hyderabad

STATUS : Constructed (ongoing IGBC certification)

PROJECT TEAM : Tripurnath & Associates

WORKS DONE : Daylight and ventilation calculation , simulations and report



Introduction :

The apartment is about 2.2 acres in site area, it consists of Single high raised apartment tower, which occupies about 1085 occupants within it, the Simulation has been performed using and daylight simulation tool for the worst case scenario flats and it has been observed that the diffused lighting, All the regularly occupied areas have a daylight level not less than 108 lux, which is more than the 1% Daylight Factor in all living spaces, 2% daylight factor in kitchen is required.

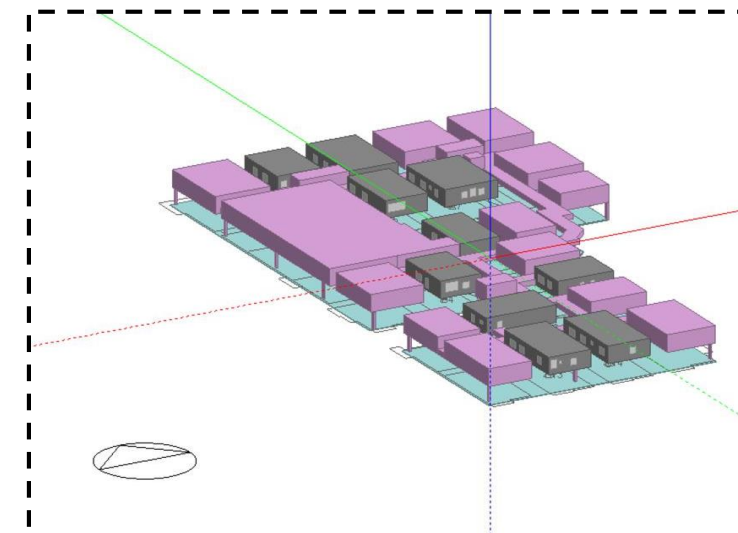


FOR DAYLIGHT FOLLOWING POINTS ARE CONSIDERED

- There are total 22 units out of which 10 units have been taken for the daylighting analysis
- These 10 units are considered as worst case as they receive less daylighting due to orientation and higher angle of obstruction (70%).

FOR VENTILATION THE FOLLOWING POINTS ARE CONSIDERED :

- The towers are spaced at a distance of 8m to enhance ventilation for each block .
- The voids between the blocks has generated better air movement
- Standard sized windows and doors that open towards the exterior environment.

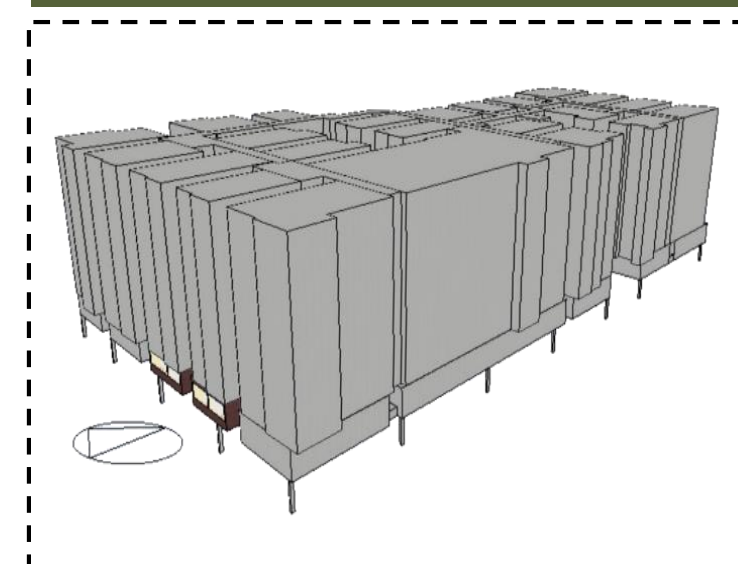
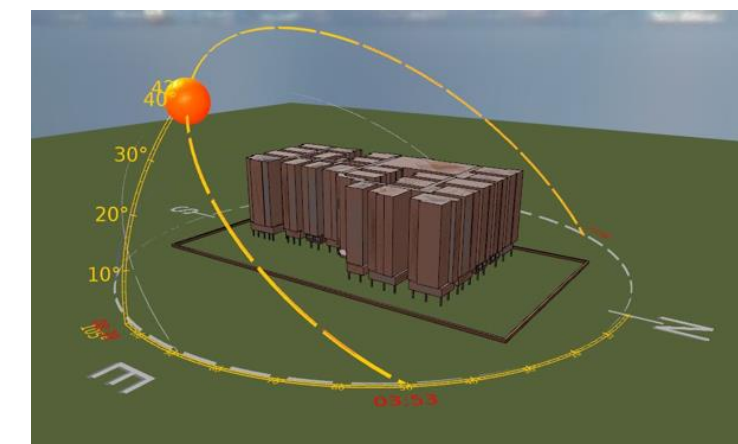


WINDOW	
W1	6'0"x4'3"
W2	5'0"x4'3"
W3	4'0"x4'3"
W4	3'0"x4'3"
W5	2'6"x5'9"
KW1	4'0"x3'0"
KW2	3'0"x3'0"

Plan showing units selected for daylight and Ventilation analysis:



Source :Autodesk AutoCAD

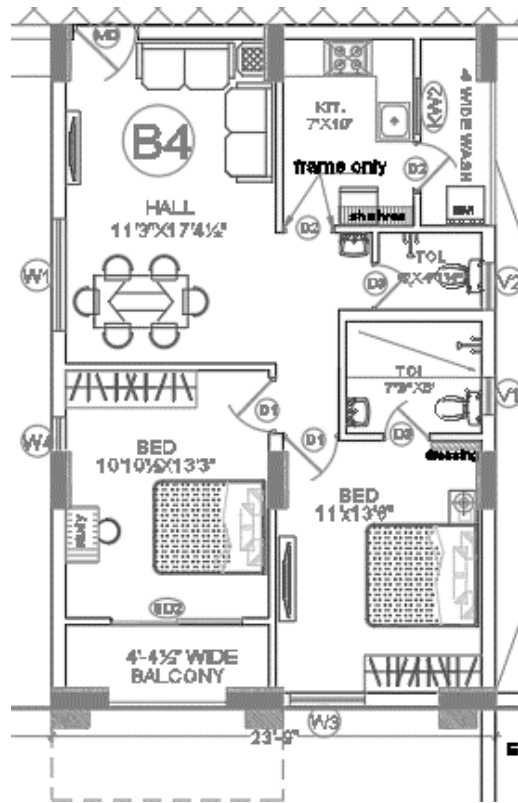


Window - Door schedule B4				
Name	Width	Height	Area	Openable Area
W2	5.00	4.25	21.25	14.24
W3	4.00	4.25	17.00	5.61
KW3	2.00	3.00	6.00	1.98
D-01(MD)	3.50	7	24.50	15.93
D-02	3.00	7.25	21.75	21.75
D-03	2.75	7.25	19.94	19.94
D-04	2.50	7.25	18.13	18.13
D-05(SD2)	0.90	2.65	2.39	2.39

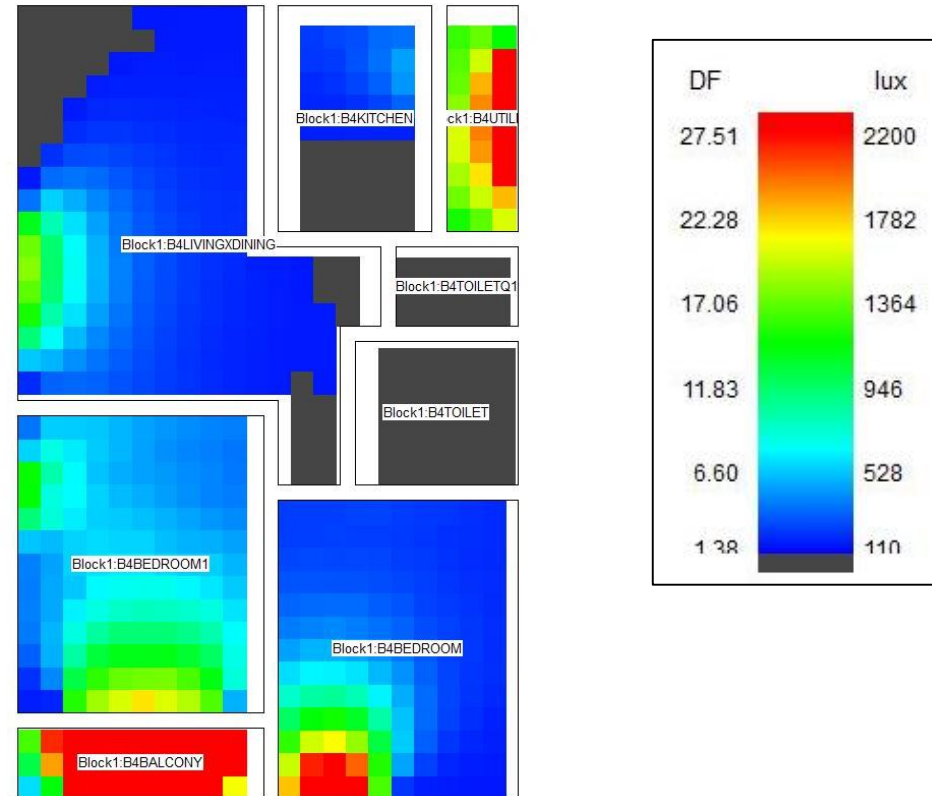
Source : Design Builder

DAYLIGHT SIMULATIONS DONE USING IESVE TOOL

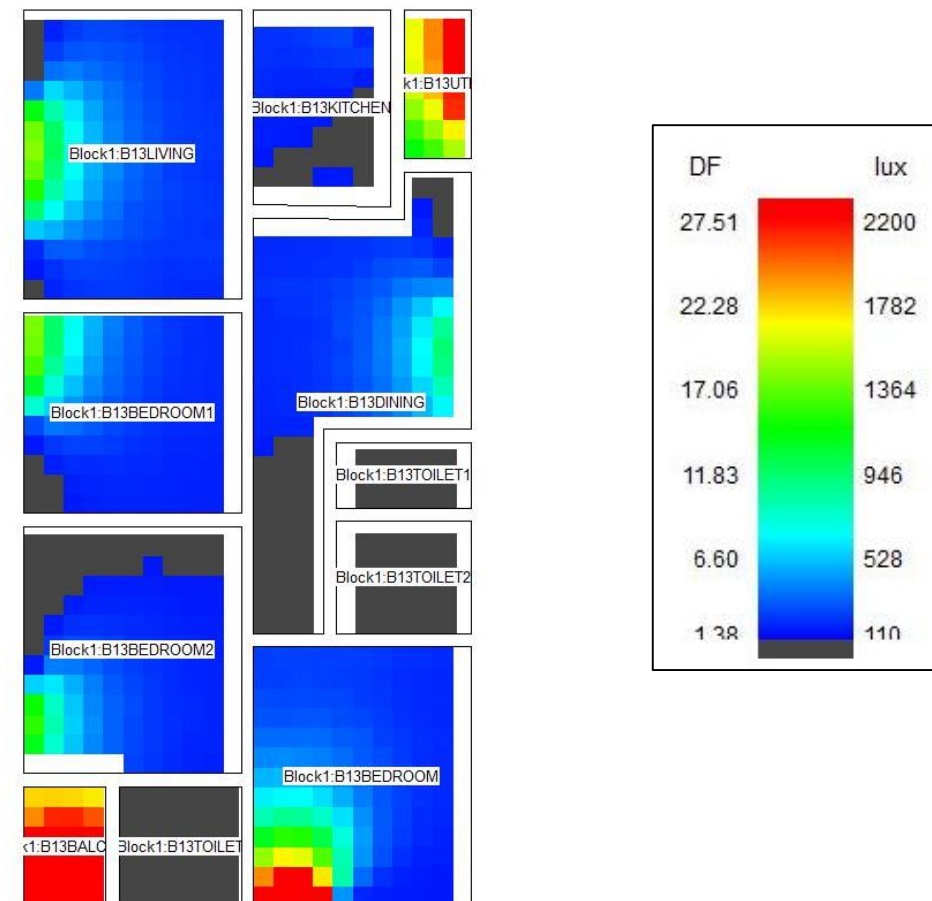
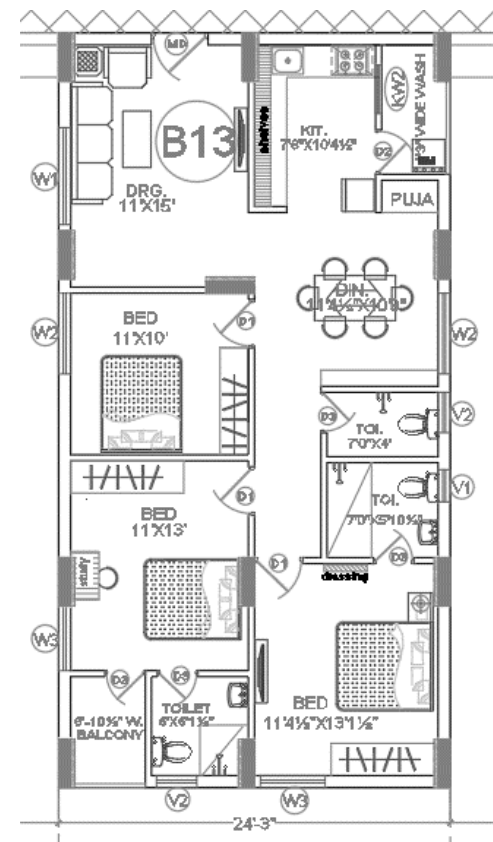
UNIT - B4



DAYLIGHT SIMULATION



UNIT - B13



Source : DESIGN BUILDER

DAYLIGHTING - RESULTS



Zone	Floor Area (m2)	Floor Area above Threshold (m2)	Floor Area above Threshold (%)
B4 LIVING&DINING	20.303	16.638	81.951
B4 KITCHEN	6.015	3.342	55.556
B4 BEDROOM	12.397	12.397	100
B4 BEDROOM 1	12.627	12.627	100
Total	51.342	45.004	84%

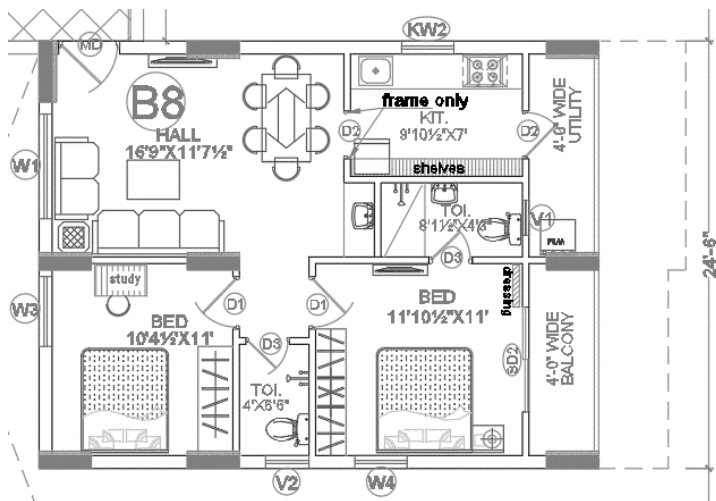
84% OF THE REGULARLY OCCUPIED AREAS MEETS DAYLIGHT LEVELS OF 110 LUX

Zone	Floor Area (m2)	Floor Area above Threshold (m2)	Floor Area above Threshold (%)
B14 BEDROOM 1	13.394	12.261	91.538
B14 BEDROOM 3	12.326	11.504	93.333
B14 DINING	13.986	10.408	74.419
B14BEDROOM 2	10.871	10.278	94.545
B14 LIVING	15.145	14.64	96.667
B14 KITCHEN	6.084	3.831	62.963
Total	46.086	39.157	86%

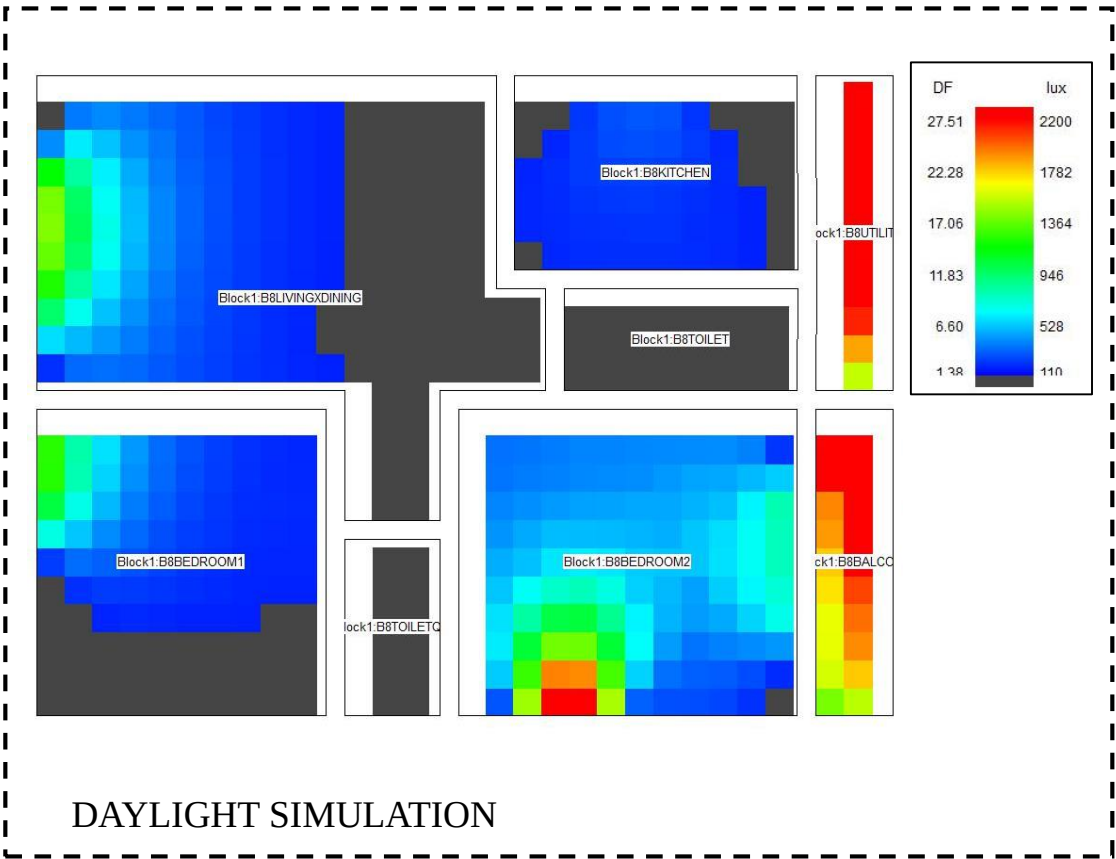
86% OF THE REGULARLY OCCUPIED AREAS MEETS DAYLIGHT LEVELS OF 110 LUX



UNIT - B8



TYPICAL FLOOR PLAN

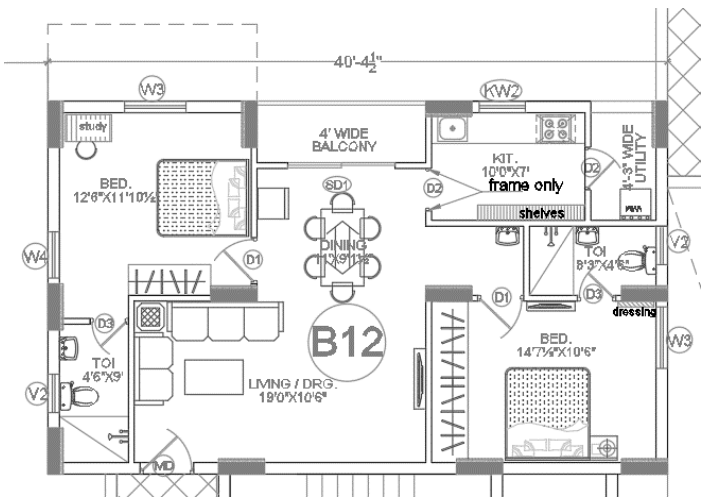


DAYLIGHT SIMULATION

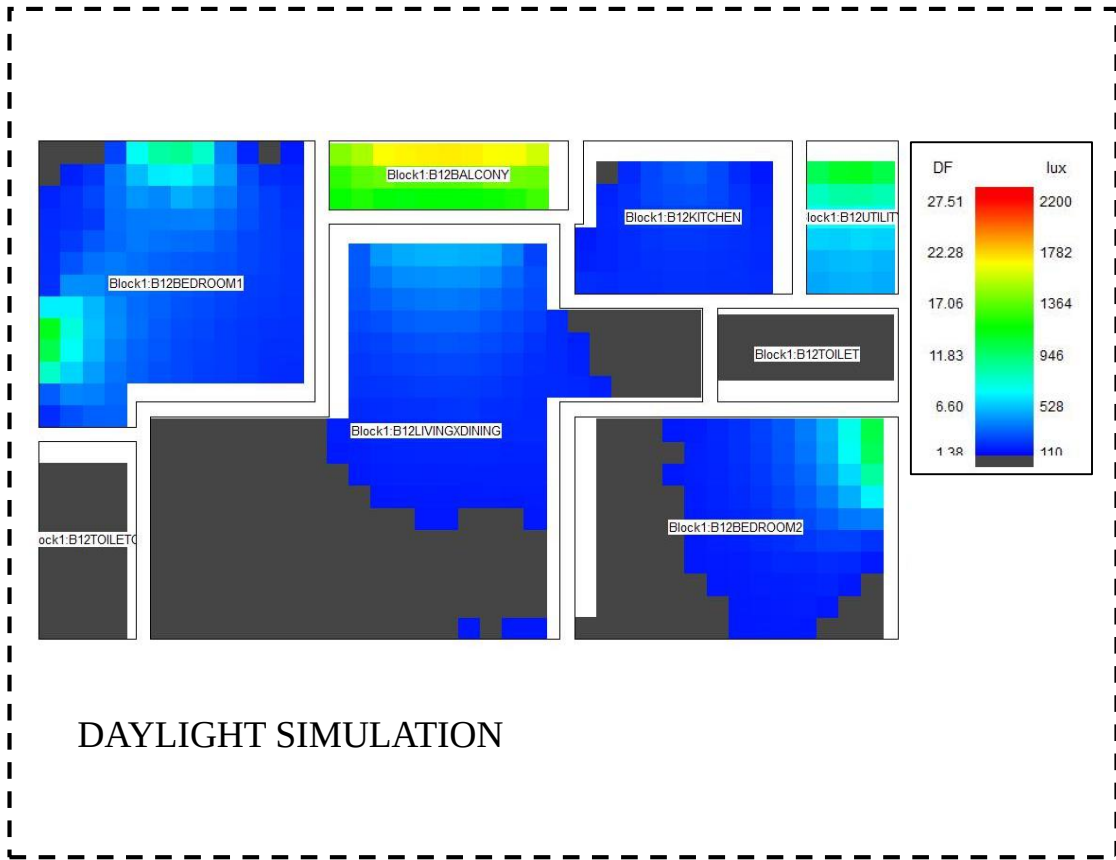
Zone	Floor Area (m2)	Floor Area above Threshold (m2)	Floor Area above Threshold (%)
B8 LIVING & DINING	18.629	11.326	60.795
B8 KITCHEN	6.305	5.334	84.59952419
B8 BEDROOM1	10.231	7.65	74.77274949
B8 BEDROOM 2	11.993	11.666	97.273
Total	47.158	35.976	79%

79% OF THE REGULARLY OCCUPIED AREAS MEETS DAYLIGHT LEVELS OF 110 LUX

UNIT - B12



TYPICAL FLOOR PLAN



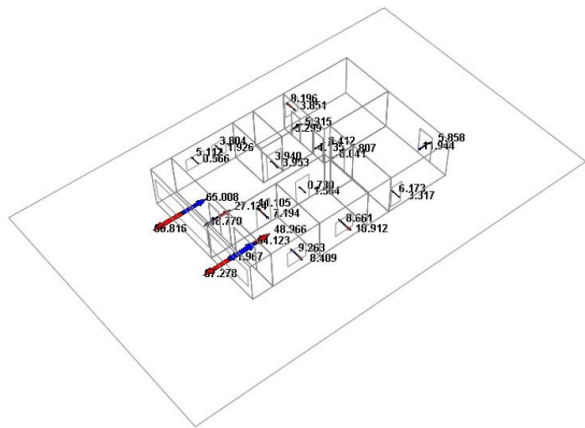
DAYLIGHT SIMULATION

Zone	Floor Area (m2)	Floor Area above Threshold (m2)	Floor Area above Threshold (%)
B12 BEDROOM 1	13.864	13.369	96.429
B12 KITCHEN	6.037	5.919	98.039
B12 LIVING & DINING	27.735	14.184	51.141
B12 BEDROOM 2	13.374	8.269	61.832
Total	61.01	41.741	77%

77% OF THE REGULARLY OCCUPIED AREAS MEETS DAYLIGHT LEVELS OF 110 LUX

The same result summary was generated for all five units

Ventilation (Macroflow vent analysis): The analysis has been carried out considering the window typology as per the schedule and with openable area of 50%.



SIMULATION RESULT

- Regular occupied area**
- 1.Living
 - 2.Kitchen
 - 3.Master Bedroom
 - 4.Bedroom

- Non regular occupied area**
- 1.Attached Toilet
 - 2.Common Toilet
 - 3.Utility
 - 4.Balcony

MacroFlo Opening Types

MacroFlo Opening

XTRN0000 External window opening

Reference ID: XTRN0000

Description: External window opening

Exposure Type: 05. 1:1 semi-exposed wall

Opening Category: Custom / sharp edge orifice

Openable Area %: 100

Equivalent orifice: 100 % of gross

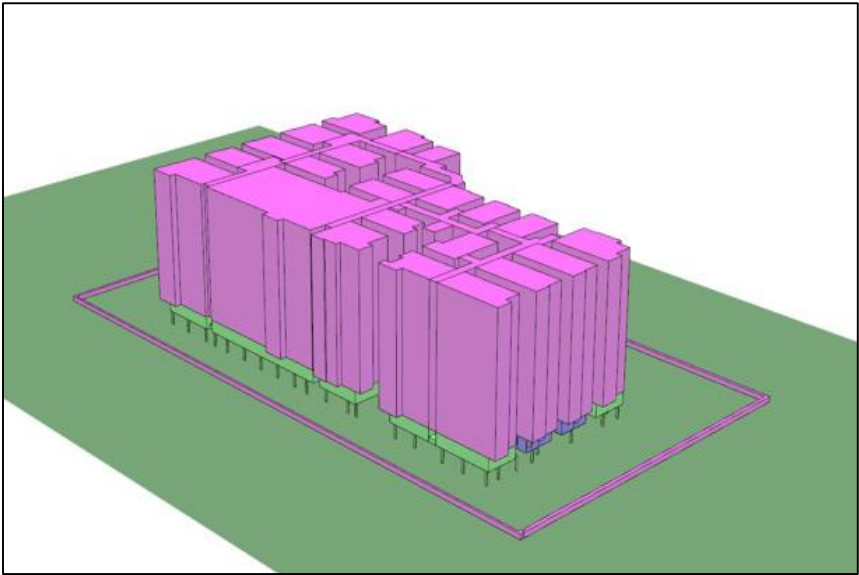
Crack Flow: 0.150 l/(s·m·Pa^{0.6})

Crack Length: 0 % of opening perimeter

Opening threshold: 0.00 °C

Degree of Opening (Modulating Profile): on continuously

Source :IESVE



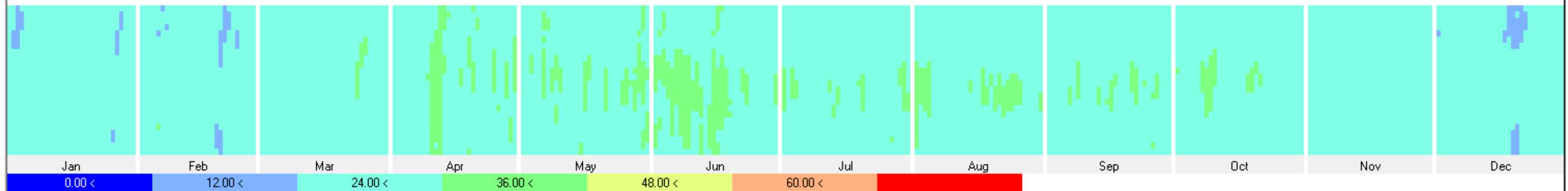
Location	Filename	Type	Min. Val.	Min. Time	Max. Val.	Max. Time	Mean
A4 LIVING AREA	A4.aps	Air change rate (ACH)	0.00	03:30,02/Jan	210.44	03:30,14/May	37.95
A4 MASTER BEDROOM	A4.aps	Air change rate (ACH)	0.00	18:30,02/Jan	137.10	21:30,05/May	18.36
A4 BEDROOM	A4.aps	Air change rate (ACH)	0.00	03:30,02/Jan	309.46	03:30,14/May	40.61
A4 KITCHEN	A4.aps	Air change rate (ACH)	0.00	18:30,02/Jan	259.50	21:30,05/May	33.33

Angle of deviation

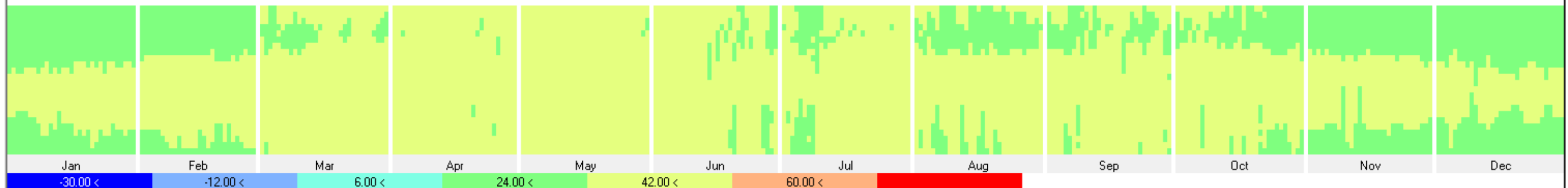
Ground Floor																										
Regularly Occupied Spaces	Total Floor Area (Carpet) (Sq.ft)	Total Floor Area (Carpet) (Sq.m)	Window type 1	Window type 2	Window type 3	Window type 4	Window type 5	Window type 6	Glazed Door Type 1	Glazed Door Type 2	Wooden Doors	Operable Window 1 Area	Operable Window 2 Area	Operable Window 3 Area	Operable Window 4 Area	Operable Window 5 Area	Operable Window 6 Area	Operable glazed Door Area Type 1	Operable glazed Door Area Type 2	Operable Wooden Door Area	Total Operable area	Opening to carpet area ratio	Mandatory Requirement to Meet credit point - Fresh Air	Credit Requirement to Meet credit point	Does it meet MR for Fresh Air	Does it meet CR for Fresh Air
Kitchen	400.00	37.16	W5	W5	W5						D-01	0.54	0.54	0.54	0.00	0.00	0.00	0.00	0.00	3.18	4.80	12.92%	8.00%	10.00%	Yes	Yes
Kitchen - Staff Quarters	42.00	3.90	W3									0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	20.18%	8.00%	10.00%	Yes	Yes
Reception & Waiting	594.00	55.18	W4	W4	W4	W4	W4	W4	GLD-1	GLD-3		1.50	1.50	1.50	1.50	1.50	1.50	3.86	3.92	0.00	16.79	30.43%	10.00%	13.00%	Yes	Yes
Dining area	480.00	44.59	W4	W4	W4					GLD-2		1.50	1.50	1.50	0.00	0.00	0.00	0.00	3.08	0.00	7.59	17.03%	10.00%	13.00%	Yes	Yes
Staff Quarters	290.00	26.94	W4	W4							D-06	1.50	1.50	0.00	0.00	0.00	0.00	0.00	0.00	2.21	5.21	19.34%	10.00%	13.00%	Yes	Yes
Drivers Waiting	110.00	10.22	W2								D-06	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.21	3.26	31.95%	10.00%	13.00%	Yes	Yes
Suite-1 (Bed & Liv)	522.00	48.49	W1	W4	W4							6.60	1.50	1.50	0.00	0.00	0.00	0.00	0.00	0.00	9.61	19.81%	10.00%	13.00%	Yes	Yes
Suite-2 (Bed & Liv)	522.00	48.49	W1	W4	W4							6.60	1.50	1.50	0.00	0.00	0.00	0.00	0.00	0.00	9.61	19.81%	10.00%	13.00%	Yes	Yes
Suite-3 (Bed & Liv)	522.00	48.49	W1	W4	W4	W4	W4					6.60	1.50	1.50	1.50	1.50	0.00	0.00	0.00	0.00	12.61	26.01%	10.00%	13.00%	Yes	Yes
Suite-4 (Bed & Liv)	522.00	48.49	W1	W4	W4	W4						6.60	1.50	1.50	1.50	0.00	0.00	0.00	0.00	0.00	11.11	22.91%	10.00%	13.00%	Yes	Yes

TEMPERATURE AND EIND SPEED CHART : HYDERABAD

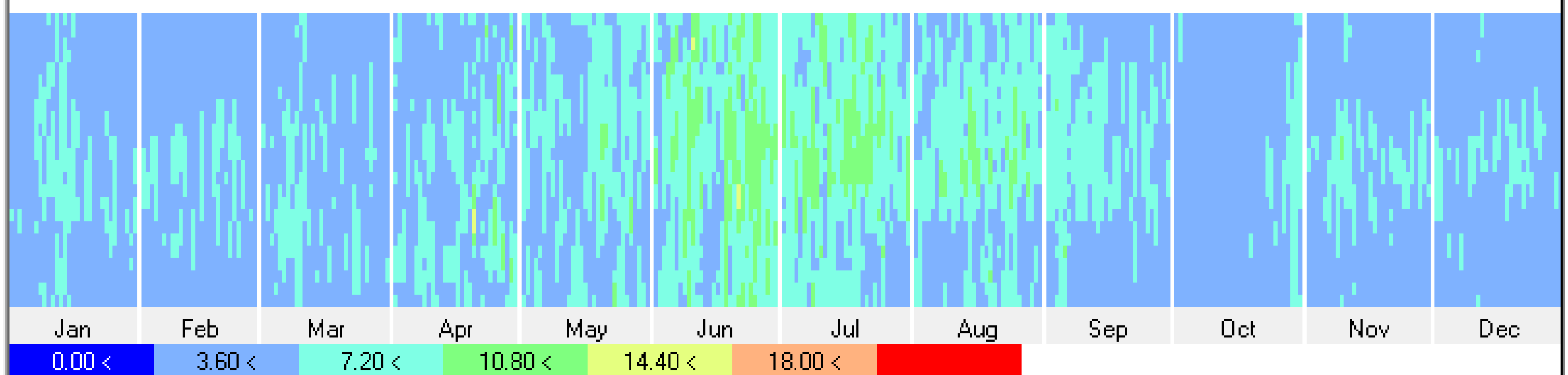
Wet-bulb temperature: (IND_Hyderabad.431280_ISHRAE.epw) - °C



Dry-bulb temperature: (IND_Hyderabad.431280_ISHRAE.epw) - °C

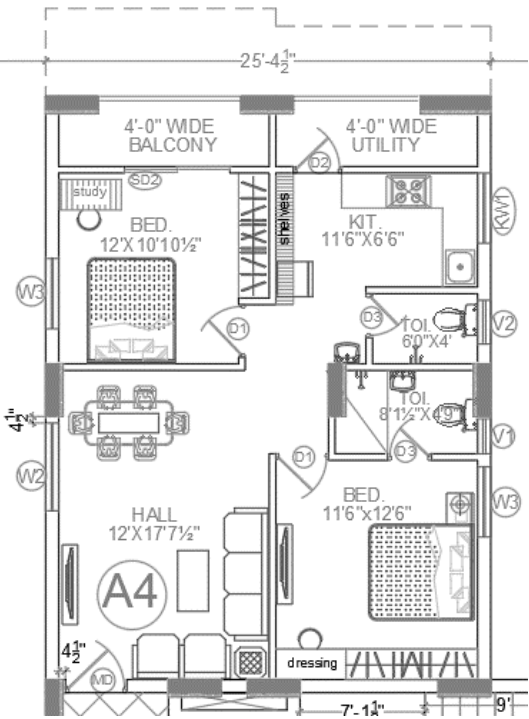


Wind speed: (IND_Hyderabad.431280_ISHRAE.epw) - m/s

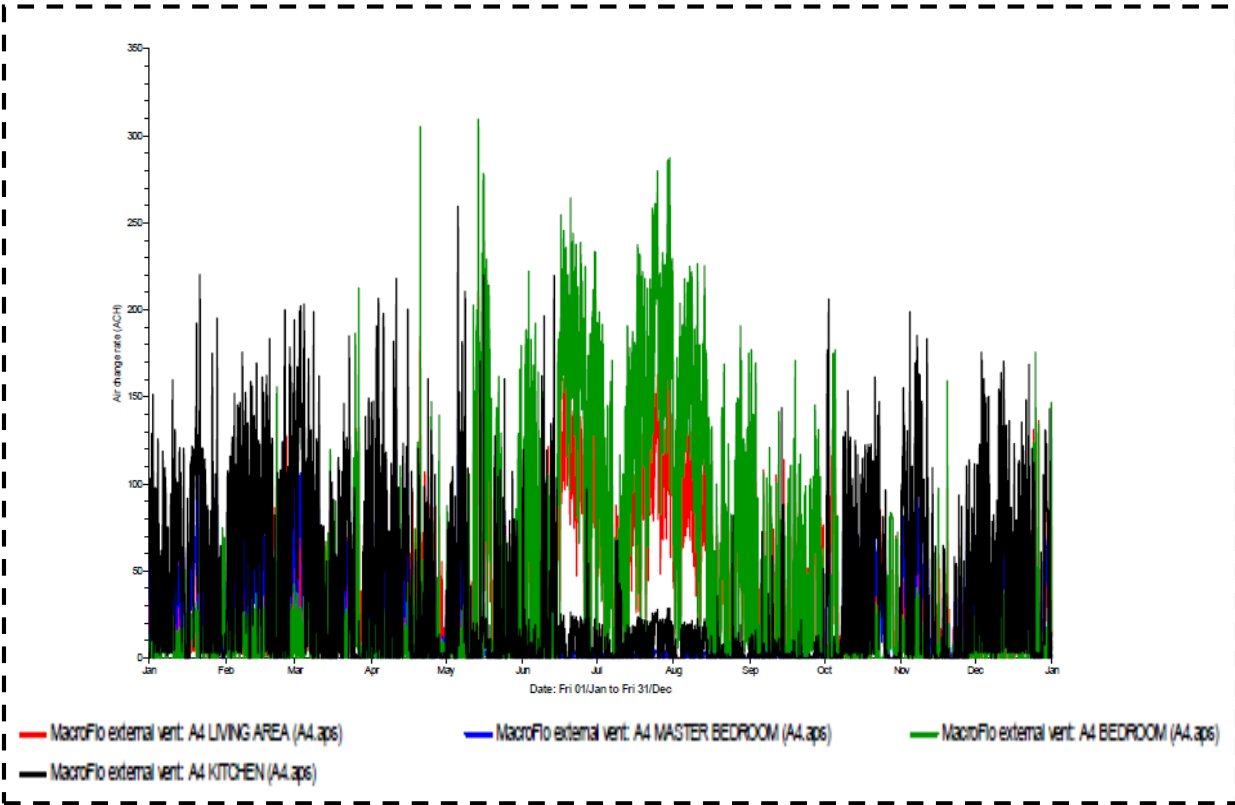


Source : IESVE Simulation software

UNIT - A4



TYPICAL FLOOR PLAN

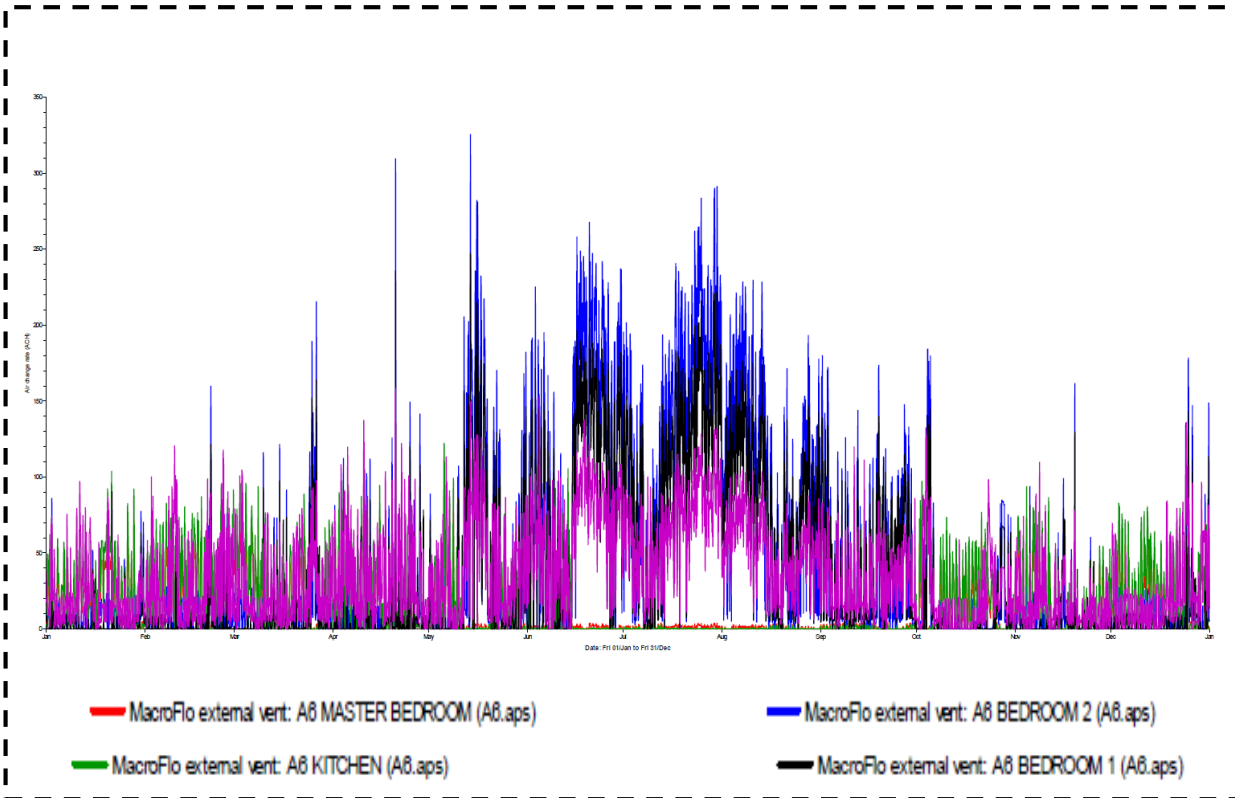
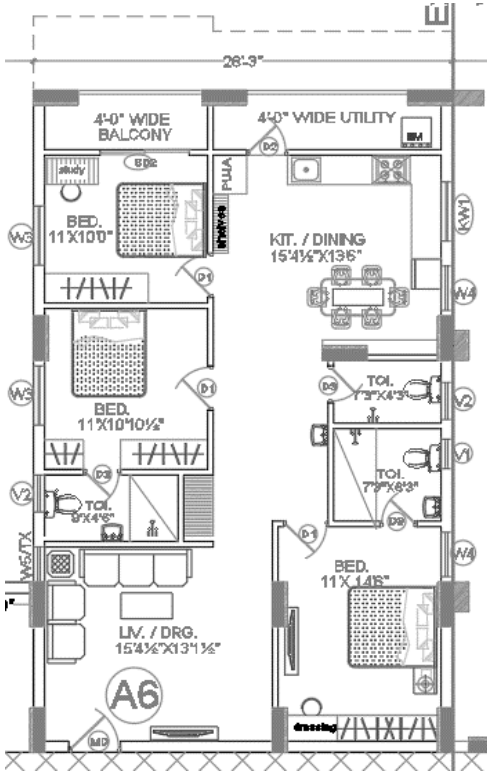


RESULT SUMMARY



Var. Name	Location	Type	Mean
Macro Flow internal and external vent	A4 – LIVING AREA	Air change rate (ACH)	37.95
	A4- KITCHEN		33.33
	A4- MASTER BEDROOM		18.36
	A4- BEDROOM		40.61

UNIT – A6



Var. Name	Location	Type	Mean
Macro Flow internal and external vent	A5 – LIVING AREA	Air change rate (ACH)	52.55
	A5- KITCHEN		29.94
	A5- MASTER BEDROOM		19.61
	A5- BEDROOM		32.42

The same result summary was generated for all five units



PROJECT 2

Railway guest house @ Hyderabad

TYPOLOGY : Residential

LOCATION : Karmanghat, Hyderabad

STATUS : Constructed (ongoing IGBC certification)

PROJECT TEAM : Apurva Parikh architects

WORKS DONE : Daylight and ventilation calculation , simulations and report

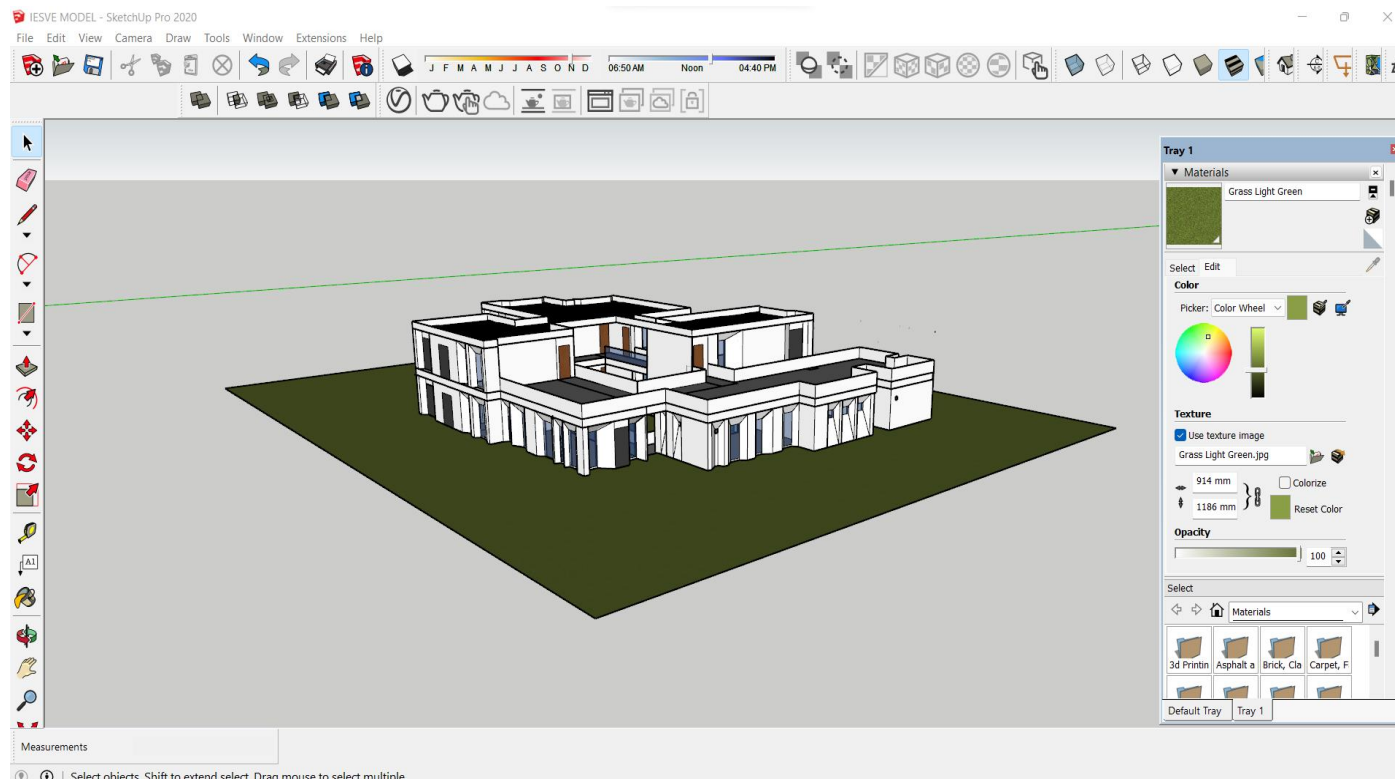


INTRODUCTION :

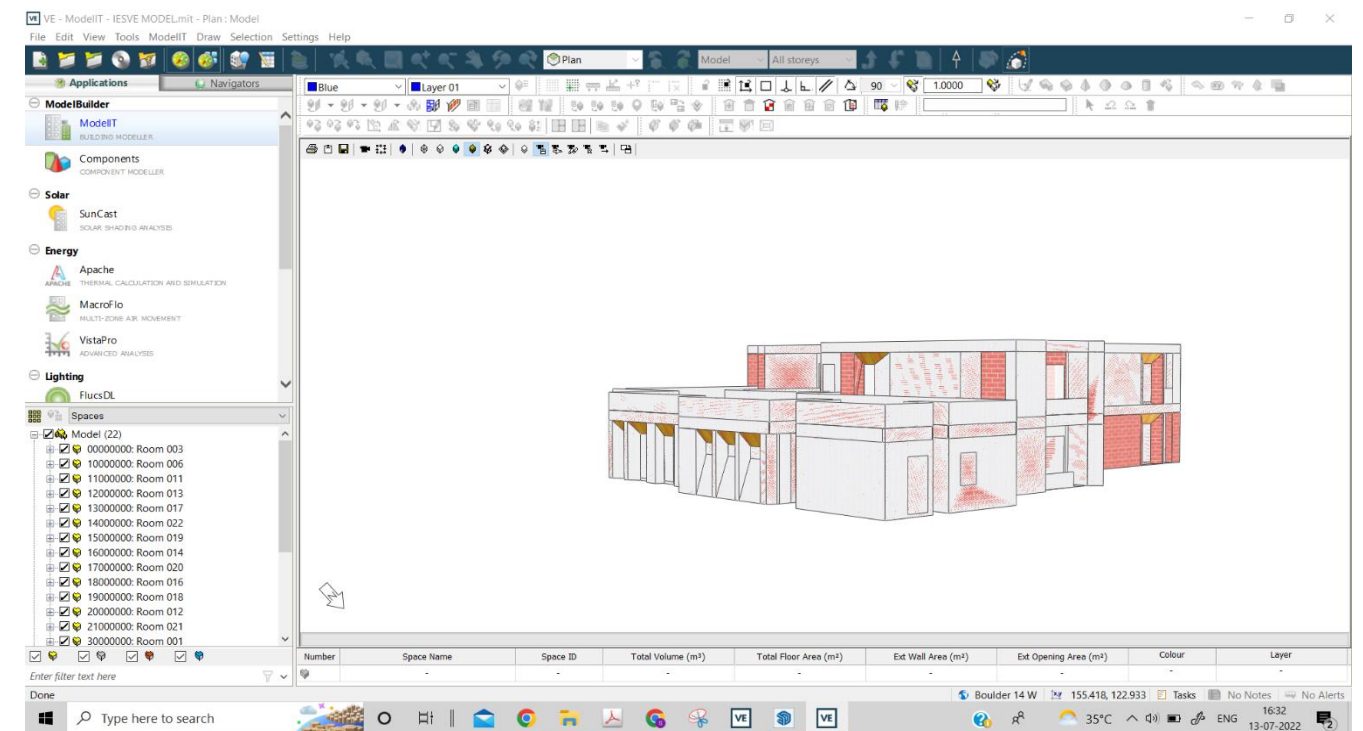
The guest house model was created in Sketch up using given elevations and plans . Guest house single line model was designed in sketch up to export in IESVE Software for simulations .The simulations output was done for the IGBC certification



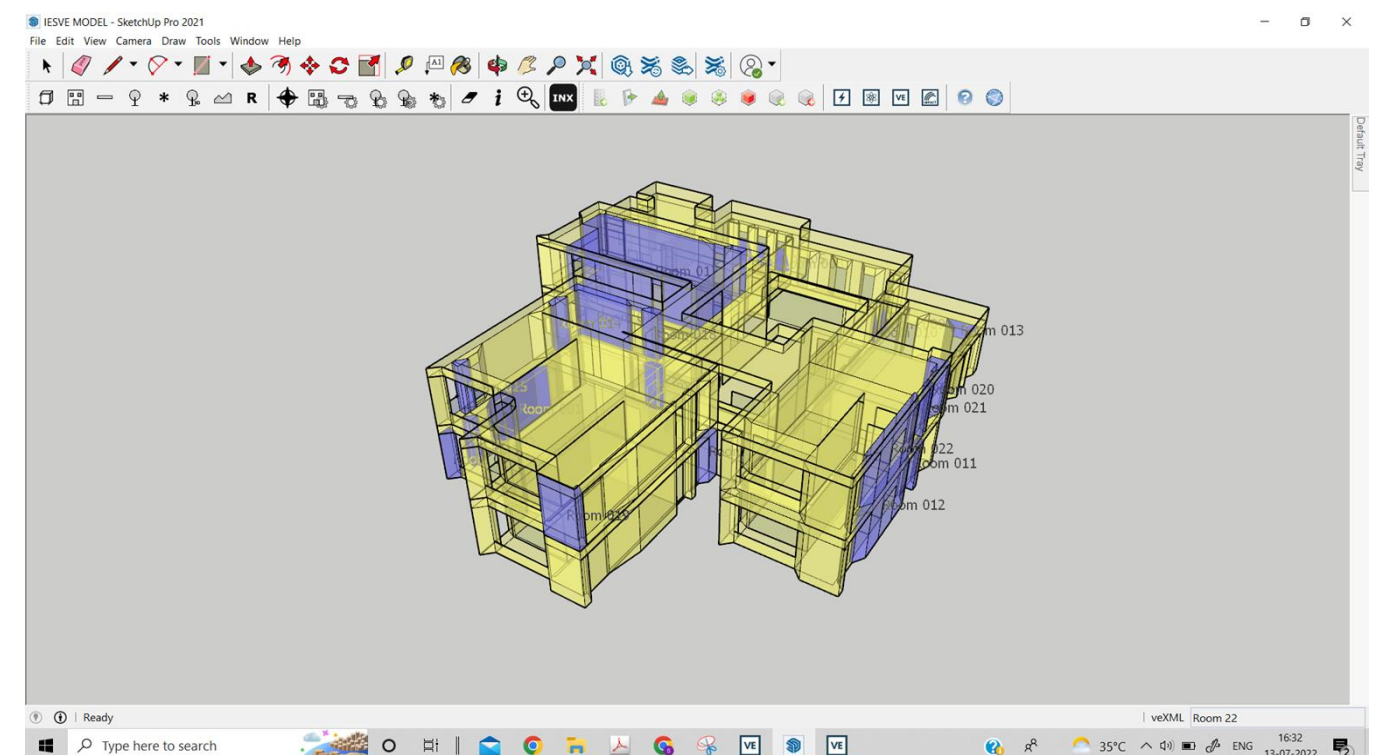
View of the guest house



Single line model of the guest house (Source : Sketchup)



IESVE : imported single line model



Importing sketchup model into IESVE through plugin

PROJECT 3

Nexus Green Mall @ Bangalore

TYPOLOGY : Commercial
 AREA : 34118.38 sqm
 LOCATION : Whitefield , Bangalore
 STATUS : Constructed (ongoing IGBC certification)
 PROJECT TEAM : Prestige Group
 WORKS DONE : Preliminary Review for IGBC certification

Certification Level	Tenant-occupied Buildings	Recognition
Certified	40-49	Best Practices
Silver	50-64	Outstanding performance
Gold	65-79	National Excellence
Platinum	80-100	Global Leadership



The preliminary review was conducted for the green mall based on the enclosures submitted . The IBGC existing building credits were referred for this review. **The credits include site & facility management , water efficiency , energy efficiency , health & comfort and innovation category .** After the final review this building has achieved silver rating .

CREDIT : SITE & FACILITY MANAGEMENT

IGBC Green Existing Buildings O&M Preliminary Review

Project Name: Nexus – Whitefield Mall, Bengaluru

Project No: EB XX XXXX

Review Date: 01 August 2022

Anticipated

Pending

Deferred

0

13

1

Site & Facility Management

Possible Points – 18

Y

Green Policy

Mandatory Requirement 1

CAA

Preliminary Review:

The submitted narrative states that the project has an environmental green policy in place and that it is being followed. The submittals include an organizational green policy, declaration on local building compliance, and document on safety & environmental quality

The eco-friendly practices considered in the policy include:

1. Building materials including interior materials to have at least 10% recycled content, by cost.

2. 75% of the Waste generated on-site to be diverted away from landfills.

3. Paints and adhesives to have low VOC.

4. Workmen involved in the construction to be provided with restrooms and drinking water.

5. All appliances purchased to have BEE 3 star or above rating. This applies to appliances for which the BEE star labelling program is applicable.

This meets the prerequisite requirement.

Requirements:

To ensure that the building conforms to the requirements of the local bylaws, provide a declaration from the building owner stating that the required clearances from all regulatory bodies are in place. Have a policy in place which mandates the adoption of at least 3 of the following eco-friendly practices during renovation of the building.

Building materials including interior materials to have at least 10% recycled content, by cost

50% of the wood materials to have FSC or PEFC or equivalent certification

50% of waste generated (by weight or volume) on site do not go to a landfill

Paints and adhesives to have low VOC

Workmen involved in the construction to be provided with restrooms and safe drinking water facility.

All appliances purchased to have BEE 3 star or above rating. This applies to appliances for which the BEE star labelling program is in place.

Y

Waste Collection & Disposal

Mandatory Requirement 2

Pending

Preliminary Review:

The submitted narrative states that the project has waste collection system and waste management policy in place. The narrative also clarifies that the waste generated is collected and segregated in the common waste segregation facility.

The submittal includes photographs of centralized waste collection, segregation areas, waste bins in the common areas, and agreement copies for dry, e-waste, and wet waste. The submittals also include waste generation and disposal for last 4 years.

However, additional details are required to comply with the prerequisite requirement.

IGBC Green Existing Buildings O&M Preliminary Review

Project Name: Nexus – Whitefield Mall, Bengaluru

Project No: EB XX XXXX

Review Date: 01 August 2022

Requirements:

Demonstrate an ongoing solid waste collection and disposal system to include both hazardous & non-hazardous waste. Hazardous waste includes e-waste, batteries, lamps etc and non-hazardous waste includes paper, plastic, metals, organic waste, etc. The project has to follow the generated management Guidelines as prescribed by Ministry of Environment & Forest (MoEF), Government of India. Have provision to segregate at least food, e-waste, metals, plastic, and paper in the central waste collection area.

Technical Advice:

Please provide the following:

1. Clarification on how the project deals with the segregation and disposal of hazardous waste.

2. The supporting documentation to verify that the hazardous and e-waste haulers are vendors authorized by the State Government or MoEF, Government of India.

2

Eco-friendly Commuting Practices: 25%, 50%

Credit 1

Pending

Preliminary Review:

The submitted narrative indicates that the project is located within a walking distance of 130 meters from the public transport facility, catering to 48.67% (129 nos.) of the building's occupants (265 nos.). The project team has conducted a survey to determine the building occupant's mode of transport. The survey report indicates that 51.33% of the building occupants use personal vehicles. The submittal includes an aerial map indicating distance between the mall and the bus stop and a survey calculation report confirming that 48.67% of occupants travel by public transport facility.

However, additional details are required to award the credit.

Requirements:

Provide shuttle services to nearest public transportation facility (OR) Provide bus pool/van pool facilities to pick and drop permanent occupants to their residential places.

Points are awarded as below:

Percentage of occupants served with shuttle or bus/ van pool services	Points
25%	2
50%	4

Technical Advice:

Please provide the following:

1. Photographs of the nearest bus stop facility.

2. Clarification on how the public transport facilities/infrastructure can cater to 129 occupants during peak hours. Clarification narratives shall include the bus routes, mass shuttle services, and connectivity to various parts of the city, via the public transport infrastructure around the site along with the specific split-up of occupants using these facilities.

2

Eco-friendly Landscaping Practices: 50%, 75%

Credit 2

Pending

Preliminary Review:

The project team has submitted a narrative indicating that 100% of organic fertilizer has been used for landscaping. The submittals include a conceptual landscape plan, location of the OWC

IGBC Green Existing Buildings O&M Preliminary Review

Project Name: Nexus – Whitefield Mall, Bengaluru

Project No: EB XX XXXX

Review Date: 01 August 2022

Requirements:

Have in place, eco-friendly landscaping practices such as use of organic fertilisers and / or use of locally adaptive plants for a minimum of 50% of the landscape requirements.

system, photographs of the landscape and a generation report highlighting the fertilizer obtained over the period of 3 years.

However, additional details are required to award the credit.

Points are awarded as follows:

Percentage of organic fertilisers used and / or use of locally adaptive plants	Points
50%	1
75%	2

Technical Advice:

Please provide the following:

1. List of native/adaptive species planted in the facility.

2. Detailed landscape plan highlighting the native, adaptive species and turf area planted in the facility.

2

Heat Island Reduction, Non-roof: 50%, 75%

Credit 3.1

Pending

Preliminary Review:

The project team has submitted a narrative indicating that 69.54% of the total hardscape area (7,415 sq.m) is compliant with tree cover and building shade requirements.

The submittals include photographs of the hardscape area pathways & walkways and a shadow analysis study of the site.

However, additional details are required to award this credit.

Requirements:

For exposed non-roof hardscape areas (such as footpaths, pathways, roads, uncovered surface parking and other hardscape areas) within the project site, have at least one or combination of the following:

Shade from the existing tree canopy

Open grid pavers, including grass pavers

Shade from solar panels

Structured surface parking

Points are awarded as below:

Percentage of shaded non- roof hardscape areas	Points
50%	2
75%	4

Technical Advice:

Please provide the following:

1. Justification on how the project team has arrived that 69.54% of the area is shaded with

G.ABHINAYA | ROLLNO : 41890002 | SEM : 03 | BATCH : 2021-2023 | M.ARCH - SUATAINABLE ARCHITECTURE

13

PROJECT 4

Green Data centre @ Hyderabad

TYPOLOGY : Office

AREA:

LOCATION : Hyderabad

STATUS : Constructed (ongoing IGBC certification)

PROJECT TEAM : L&T Construction

WORKS DONE : Document segregation , Calculations , Certification report

Certification Level	Tenant-occupied Buildings	Recognition
Certified	40-49	Best Practices
Silver	50-64	Outstanding performance
Gold	65-79	National Excellence
Platinum	80-100	Global Leadership



DOCUMENTS REQUIRED SCHEDULE FOR IGBC SUBMISSION

IGBC GREEN NEW DATA CENTER BUILDING - NPCI HYDERABAD					
Credits		DOCUMENTS REQUIRED	Received - Yes/No/Pending		Comments
General Submittal	Architectural Drawings				
	Floor plan - CAD Format		YES		
	Site Plan - CAD Format		YES		
	Landscape Plan - CAD Format		YES		
	Section - CAD Format		YES		
	Elevation - CAD Format		YES		
	3D Views		YES		
	External photograph of construction at different working stage		YES		
	Indoor Photograph of the main building block		YES		
	MEP Drawings				
	HVAC Layout - CAD Format		YES		
	Treated Fresh Air layout - CAD Format		YES		
	STP Layout - CAD Format		YES		
	Solar Panel layout - CAD Format		YES		
	Lighting Layout - CAD Format		YES		
	Strom Drain Layout - CAD Format		YES		
	Dual Plumbing Layout - CAD Format		YES		
Credits		DOCUMENTS REQUIRED	Received - Yes/No/Pending	Points	Comments
Site Selection and Planning					
SSP Mandatory Requirement 1	Local Building Regulations	Approved drawings (site plan, floor plan, elevation & section) local government authority (or) receipt of submission	YES	Mandatory	
		Completed photographs of the facility (all elevations of the building)	YES		
		NOC Declaration - Format Attached	NO		end of this month
		Environmental clearance (EC) certificate	NO		Available
		Stability certificate signed by Architect	NO		Available
SSP Credit 1	Natural Topography or Vegetation	Photograph of landscape area of the campus	YES	2	
		Declaration - Format will be shared at the later stage	NO		Earthonomics Scope
SSP Credit 2	Universal Design	Photographs of the Universal Design restroom with signage board	PENDING	1	Photos to be given after clearing the scrap inside differentlyabled toilet
		Photographs of the differential abled parking slot with signage board	PENDING		Parking sinage present but marking not done
		Photographs of the ramp with handrail provision for differential abled person	YES		
		Photographs of the seating area near lift lobbies	PENDING		photograph of lobby provided but seating for differentlyabled not provided
SSP Credit 3	Heat Island Reduction - Roof	Tax Invoice of the SRI white paint	YES	4	
		Photographs of the SRI white paint covered in ROOF	PENDING		Please share the photograph for appliance stage .Finish stage of SRI Paint is provided
	Heat Island Reduction - Non Roof	Photographs of non roof and hardscape area (driveways & walkways)	YES		
SSP Credit 4	Outdoor Light Pollution Reduction	Tax Invoice of all types of External Lighting Fixtures	NO	1	we have received specification sheet for the external lighting fixtures. Please share the tax invoice for all types of external lighting fixxtures
		Photographs (Daytime and Night time) of all types of external lighting fixtures installed in the project	PENDING		photos of Night time lighting showing solar light pole required

Energy Efficiency					
EE Mandatory Requirement 1	Ozone Depleting Substances	Photographs of the installed HVAC system and fire-suppresants.	YES	Mandatory	
		Technical details of the HVAC system (types of system installed VRF units)	YES		
		Declaration format to be shared - Format Attached	NO		Earthonomics Scope
EE Mandatory Requirement 2	Commissioning Plan for Data Center Equipment & Systems	Commissioning report - HVAC systems - chiller, VRF systems, primary & secondary water pumps, cooling tower, Computer Room Air Conditioning (CRAC), Precision Air Handling Units (PAHU), fresh air fans and flow settings, VFDs	NO	Mandatory	L&T
		Commissioning report - Unitary air-conditioners / direct expansion equipment	NO		
		Commissioning report - Temperature and RH measurements in individual spaces	NO		
		Commissioning report -Pumps & motors	NO		
		Commissioning report - Lighting systems	NO		
		Commissioning report - Renewable energy systems	NO		
		Commissioning report - Indoor Environmental Quality monitoring system	NO		
		Commissioning report - Energy and (or) Water metering	NO		
		Commissioning report -Building management system	NO		
		Commissioning report - Building management system	NO		
		Photograph of Commissioning - HVAC systems - chiller, VRF systems, primary & secondary water pumps, cooling tower, Computer Room Air Conditioning (CRAC), Precision Air Handling Units (PAHU), fresh air fans and flow settings, VFDs	NO		
		Photograph of Commissioning - Unitary air-conditioners / direct expansion equipment	NO		
		Photograph of Commissioning- Temperature and RH measurements in individual spaces	NO		
		Photograph of Commissioning -Pumps & motors	NO		
		Photograph of Commissioning - Lighting systems	NO		
		Photograph of Commissioning - Renewable energy systems	NO		
		Photograph of Commissioning - Indoor Environmental Quality monitoring system	NO		
		Photograph of Commissioning - Energy and (or) Water metering	NO		
		Photograph of Commissioning -Building management system	NO		
		Photograph of Commissioning- Building management system	NO		
EE Mandatory Requirement 3 and EE credit 4	Minimum Energy Performance	Tax Invoice of all Internal lighting fixtures	NO	Mandatory	
		Tax Invoice of HVAC equipment's	YES		
		Tax Invoice of glass (make and model number)	NO		
		Photographs of the all types of Internal Lighting	YES		
		Photographs of the HVAC Equipments	YES		
		Photographs of the Glass	YES		
		Photographs of the Insulation	YES		
		Occupant load	NO	42	Saran - NPCI
EE Credit 1	Eco-friendly Refrigerants	Tax Invoice of Fire Suppression gases	NO	1	
		Photographs of the Fire Suppression gases	YES		



EE Credit 5	Renewable Energy - On site	Tax Invoice of the solar panel systems	NO	2	
		Photographs of the solar panels	YES		
EE Credit 6	Renewable Energy - Off site	Power Purchase Agreement Copy with the RE producer	Not Attempted	4	
		12 months Energy supply data			
Operation & Maintenance					
OM Mandatory Requirement 1	Management Information System	Management and Operational Level data management protocol/SOP	EARTHONOMIC SCOPE	Mandatory	
O & M Credit 1	Real time monitoring of Equipment and Performance	Real time performance monitoring system details & Details of parameters monitored		1	
	Rack cooling index	Online RCI measurement - provide the system details		2	
	Temperature and Humidity Conditions	Details of recommended range of temperature and RH by the OEMs		2	
Water Conservation					
WC Mandatory Requirement 1	Rainwater Harvesting, Roof & Non-roof	Soil test report	YES	Mandatory	
		Photographs of the percolation pits, storm drains & storage tank	YES		
WC Credit 1	Water Metering	Single line diagram highlighting the water meter installed in the Site	YES	1	
		Tax Invoice of the installed water meters	NO		
		Photographs of the water meters with signboard	NO		
WC Credit 2	Water Efficient Plumbing Fixtures	Tax invoice copy of fixtures, urinals, water closets (make & model)	YES	2	
		Project specific manufacturer declaration - Format will be shared at the later stage	YES		
		Photographs of the Urinals, Water Closet and Taps Fixtures	YES		
WC Credit 3	Wastewater Treatment and Reuse	Technical Details of the STP(Sewage Treatment Plant) process	YES	2	
		Water balance chart of STP	YES		
		Test report of treated water	NO		
		Photographs of the STP plant	NO		
Building Materials and Resources					
BMR Mandatory Requirement 1	Policy on waste management	Signed agreement copy of waste management policy - format attached	Yes	Mandatory	
BMR Mandatory Requirement 2	Segregation of Wastes	Photographs of central waste segregation yard	NO	Mandatory	Photos of Combined dry , wet and E-waste bins required for each floor level
		Photographs of waste bins installed inside the facility (dry, wet & E- waste)	PENDING		
		Contract agreement with local recycling vendor for waste management (Hazardous and Non hazardous waste)	NO		
		Location of scrap yard in the site plan	NO		
BMR Credit 1	Use of Certified Green products, materials and equipment	Tax Invoice copies of the Green construction product product used in the project - if applicable	YES	10	
		Photograph of the Green construction product product used in the project - if applicable	YES		
BMR Credit 2	e - Waste Management	Declaration from the project team - Format will be shared at the later stage	NO	3	Earthonomics Scope
BMR Credit 3	Non-Hazardous waste & Operations	Declaration from the project team - Format will be shared at the later stage	NO	2	Earthonomics Scope

Indoor Environmental Quality					
IEQ Mandatory Requirement 1	Tobacco Smoke Control	Photographs of no smoking signages	YES	Mandatory	
		No smoking policy - Format Attached	NO		
IEQ Mandatory Requirement 2	Minimum Fresh Air Ventilation	Photographs of the TFA (treated fresh air) supplied	YES	Mandatory	
		Tax Invoice of Treated fresh air supply system	YES		
IEQ Credit 1	Indoor Air Quality Monitoring	Tax Invoice of Co2 sensor	YES	3	
		IEQ Testing report as per ISO Standard in all regular occupied areas and IT Spaces	NO		
		photographs of co2 sensors installed in the return air duct of each AHU	NO		
		Tax Invoice copies of the HEPA Filters (MERV13) of the HVAC system	YES		
		Tax Invoice of temperature and humidity sensor	NO		
		Photographs of the temperature and humidity sensor	NO		
IEQ Credit 2	Daylighting	Stimulation to be under process	EARTHONOMIC SCOPE	2	
IEQ Credit 3	Low - emitting Materials	Tax Invoice of paints & Coatings	YES	4	
		Tax Invoice of Adhesives	YES		
		Tax Invoice of carpet	NO		L&T & NPCI
		Tax Invoice of composite wood	PENDING		Please share the tax Invoice for False Flooring, Flush Door, Green Guard Toilet Cubicle, HPL Sheet, plywoods and Wooden flooring
		Photograph of Paints & Coatings	PENDING		Please share the photograph of Epoxy paint used in the project, Post construction photo is provided
		Photograph of Adhesives	YES		
		Photograph of carpet	YES		
		Photograph of composite wood	YES		
IEQ Credit 4	Occupants well-being Facilities	Photograph of a recreation areas	YES	1	
Innovation and Development					
ID Credit 1	Innovation	Earthonomic Scope	NO	5	Will be evaluated upon receipt of all the above documents
ID Credit 4	IGBC Accredited Professional	Earthonomic Scope	YES	1	
Total points				100	Points



DATA CENTRE - HYDERABAD

Area Statement		
Typology	Sq.m	Acres
Site Area	14353	3.55
Area Spilt Up		
Typology	Area Sq.m	Percentage
Regular occupied Building		
Main Building	3618.5	25%
Road Area	3982.94	27.7%
Parking Area	813	5.7%
Rainwater Harvesting Pond	173	1.2%
Security Cabin	79.8	0.6%
Transformer(RMU yard)	118	0.8%
Utility yard	957	6.7%
Pedestrian Area	410.76	2.9%
Landscape Area	4200	29.3%
Parking		
Four Wheelers	62	Nos

RAINWATER HARVESTING

Run-off Calculation				
S.No.	Zone	Area (sq.m.)	Run-off Coefficient	Impervious Area (sq. m.)
1	Cemented Roof (Main Building, Security Area)	3698.30	0.95	3513.4
2	Vegetation	4200.00	0.20	840.0
3	Hardscape (Pedestrian Walkway, Parking Area)	1223.76	0.95	1162.6
4	Road Area	3982.94	0.95	3783.8
5	Water Body (Rain Water Pond)	173.00	0.00	0.0
6	Utility Area (Transformer)	118.00	0.95	112.1
Net Impervious Area				9411.9
Rainfall Intensity (m/day) considering 7.5% (Mandatory) of average peak rainfall				0.023
Total Run-off Volume (Cu.m.) for 7.5% average peak rain fall				219.25
Proposed Rain Water Tank pond 160 sq.m x 1.75 depth				280

Year	Peak Month Rainfall	Peak Rainfall (mm)
2016	September	435
2017	August	250
2018	August	146
2019	September	339
2020	October	383
Last 5 years average daily rainfall (mm)		
310.60		
Annual rainwater storage		
Annual average rainfall	962.78	mm
Proposed rainwater tank	280	Cu.m
Rainfall Intensity considering 30% of average rainfall	0.3	m
Net Impervious Area	9411.85	Sq.m
Total runoff value	2823.555	cu.m
No of times refilling per annual	10	Times

YEAR	JAN	FEB	MARC	APRI	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2016	1.2	0	0.3	6.6	124.5	105.4	185.8	111.7	435	63.5	4.6	2.5	1041.1
2017	0	0	2.5	18.5	42.6	163.3	138.8	250.5	155.7	248.4	0	0	1020.3
2018	0	0	0.8	46.2	43	85.7	103.9	146.5	97.1	40.8	0	18.6	581.8
2019	8.4	1.7	0	36.1	16.1	116.9	86.4	157.4	339.7	132.3	1	4.7	900.7
2020	22.1	2.1	15.4	20.5	30.8	203.6	147.6	244	193.1	383	7.8	0	1270
Annual average rainfall													962.78

Customized Rainfall Information System (CRIS)
Hydromet Division
India Meteorological Department
Ministry Of Earth Sciences
New Delhi-110 003

Choose the States/UTs: TELANGANA Select District: HYDERABAD GO

District : HYDERABAD

Note : (1) The District Rainfall in millimeters (R/F) shown below are the arithmetic averages of Rainfall of Stations under the District.
(2) % Dep. are the Departures of rainfall from the long period averages of rainfall for the District.
(3) Blank Spaces show non-availability of Data

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP
2016	1.2	-80	0.0	-100	0.3	-98	6.6	-68	124.3	268	105.4	-5
2017	0.0	-100	0.0	-100	2.5	-83	18.5	-9	42.6	26	163.3	47
2018	0.0	-100	0.0	-100	0.8	-94	46.2	120	43.0	20	85.7	-18
2019	8.4	15	1.7	-80	0.0	-100	36.1	66	16.1	-55	116.9	11
2020	22.1	203	2.1	-76	15.4	-12	20.5	-6	30.8	-14	203.6	93

Annual rainwater storage		
Annual average rainfall	962.78	mm
Proposed rainwater tank	280	Cu.m
Rainfall Intensity considering 30% of average rainfall	0.3	m
Net Impervious Area	9411.85	Sq.m
Total runoff value	2823.555	cu.m
No of times refilling per annual	10	Times

WATER FIXTURE

DATA CENTRE								
S.no	Fixtur type	Duration(Minutes)	Daily use per FTE	No . Of Occupants	Baseline		Proposed case	
					Flow rate	Total daily Water	Flow rate	Total daily Water
1	Water closets (Full flush)	1	2	50	6	600	4	400
2	Water closets (Half flush)	1	2	25	3	150	2	100
3	Faucets	0.25	4	50	6	300	2.5	125
4	Health faucets	0.25	1	50	6	75	3.8	47.5
5	Urinal	1	2	25	4	200	1.25	62.5
6	Shower	8	0.1	3	10	24	6	14.4

Occupants Detail			
OVERALL OCCUPANTS		50	HEADS
SERVICE STAFF MALE (considering 5% of occupants as service staff)		3	HEADS
SERVICE STAFF FEMALE (considering 5% of occupants as service staff)		3	HEADS
MALE(Considering 50% of occupants as male)		22	HEADS
FEMALE(Considering 50% of occupants as female)		22	HEADS
Baseline consumption	1349	Proposed Consumption	749.4
Percentage savings			44.45%

LANDSCAPE DETAILS

Proposed Landscape Species Details - NPCI HYDERABAD (Composite Climate Zone)		
Trees		
S.No	Botanical Name	Types of Species
1	Albizia Lebbeck	Drought Tolerant
2	Atalantia monophylla	Drought Tolerant
3	Azadirachta Indica	Drought Tolerant
4	Barringtonia acutangula	Drought Tolerant
5	Baccharis racemosa	Drought Tolerant
6	Bauhinia Tomentosa	Drought Tolerant
7	Bombax Ceiba	Drought Tolerant
8	Calophyllum Inophyllum	Drought Tolerant
9	Cassia Fistula	Drought Tolerant
10	Diospyros Perigrina	Drought Tolerant
11	Erythrina Indica	Drought Tolerant
12	Garcinia Spicata	Non Drought Tolerant
13	Ixora Pavetta	Drought Tolerant
14	Memecylon Sdula	Drought Tolerant
15	Mimusops Elengi	Non Drought Tolerant
16	Murraya Paniculata	Drought Tolerant
17	Terminalia Arjuna	Drought Tolerant
18	Terminalia Bellirica	Drought Tolerant
19	Thespesia populnea	Non Drought Tolerant

Lawn		
S.No	Botanical Name	Types of Species
1	Paspalum Lawn	Drought Tolerant
2	Taiwari Slab	Drought Tolerant
Shrubs		
S.No	Botanical Name	Types of Species
1	Bamboo Grass	Drought Tolerant
2	Clematis Gouriana	Drought Tolerant
3	Clerodendrum Splendens	Drought Tolerant
4	Clerodendrum Thorspionae	Non Drought Tolerant
5	Cuphea Hyssopifolia	Drought Tolerant
6	Eranthemum Bicolor	Drought Tolerant
7	Eranthemum Nigrum	Drought Tolerant
8	Eranthemum Roseum	Drought Tolerant
9	Gardinia	Non Drought Tolerant
10	Heliconia Psittacorum	Drought Tolerant
11	Hiptage madablota	Non Drought Tolerant
12	Ixora Nana	Drought Tolerant
13	Lorapetalum Chinense	Non Drought Tolerant
14	Ophiopogon Jaburan	Drought Tolerant
15	Philodendron Xanadu	Drought Tolerant
16	plumbago Auriculata	Drought Tolerant
17	Pseuderanthemum Reticulata	Drought Tolerant
18	Pseudocalymma Allicaceum	Non Drought Tolerant
19	Quisqualis Indica	Drought Tolerant
20	Raphis Excelsa	Drought Tolerant
21	Ravenia Spectabilis	Drought Tolerant
22	Russelia Juncea	Drought Tolerant
23	Syngonium Podophyllum	Drought Tolerant
24	Tabernaemontana Coronaria	Drought Tolerant
25	Thyallis Glauca	Drought Tolerant
26	Thunbergia Erecta	Drought Tolerant
27	Vallisneria Heynei	Drought Tolerant

U VALUE CALCULATIONS

Building envelope	Assembly	Thickness(m)	Thermal Conductivity (w/m.k)	Thermal Resistance	Thermal Transmittance(w/m2.k)
WALL(OPAQUE)	External plaster	0.02	0.2	0.1	0.78
	ACC	0.2	0.18	1.11	
	Internal plaster	0.015	0.2	0.075	
				1.29	

Building envelope	Type	Thickness(m)	SF %	Thermal Transmittance(w/m2.k)	VLT	SC	SHGC
SINGLE GLAZED GLASS	clear	0.006	59	5.4	0.54	0.68	0.5916
DOUBLE GLAZED GLASS	clear	0.06+0.012+0.06	48	2.8	0.47	0.55	0.4785

Building envelope	Assembly	Thickness(m)	Thermal Conductivity (w/m.k)	Thermal Resistance	Thermal Transmittance(w/m2.k)
ROOF(OPAQUE)	WHITE PAINT	SRI-122			1.02
	WATER-PROOFING + 6MM THK LIME PLASTER WITH LIME RENDERING + OIL BOUND DISTEMPER PAINT	0.15	0.73	0.21	
	CONCRETE ROOF	0.175	0.25	0.7	
	Internal plaster	0.015	0.2	0.075	
				0.98	

INDOOR AND OUTDOOR LIGHTING CALCULATIONS



Floor Name	Lighting Type	Wattage	No. of lights	Total Wattage
Basement Floor	Industrial Battern (Suspended)	38	21	798
	Emergency industrial Battern	38	2	76
	Industrial Battern wall mounted	38	1	38
	Emergency Industrial Battern wall mounted	38	3	114
TOTAL WATTAGE - BASEMENT				1026
Ground floor	2*2 Light Fixture	31	20	620
	DownLight	15	59	885
	LED Industrial Battern	38	198	7524
	LED DownLight	8	15	120
	LED DownLight	18	47	846
	LED Bulkhead	18	1	18
TOTAL WATTAGE - GROUND FLOOR				10013
First Floor	LED DownLight	15	75	1125
	Emergency LED Lights	15	14	210
	Industrial Battern (Suspended)	38	68	2584
	Emergency industrial Battern	38	14	532
	2*2 LED Light fixture	31	173	5363
	2*2 emergency Light fixture	31	21	651
	LED Bulkhead	18	2	36
TOTAL WATTAGE - FIRST FLOOR				10501
SecondFloor	DownLight	15	8	120
	Emergency LED DownLights	15	2	30
	LED Industrial Battern (Suspended)	38	92	3496
	LED Emergency Industrial Battern	38	26	988
	EmergencyIndustrial Battern (wall mounted)	38	8	304
	Bulkhead LED	18	2	36
TOTAL WATTAGE - SECOND FLOOR				4974
Third Floor	Downlight	15	36	540
	Emergency Downlight	15	9	135
	Industrial Battern (Suspended)	38	80	3040
	Emergency Industrial Battern (suspended)	38	15	570
	Emergency Industrial Battern (wall mounted)	38	8	304
	2*2 Light Fixture	31	48	1488
	2*2 Emergency Light fixture	31	6	186
	Led Downlight	8	18	144
	LED Emergency Downlight	8	2	16
	LED Bulkhead	18	2	36
TOTAL WATTAGE - THIRD FLOOR				6459
Fourth Floor	LED Industrial Battern	38	20	760
	LED Emergency Industrial Battern	38	6	228
	Industrial Battern Wall Mounted	38	1	38
	TOTAL WATTAGE(closed space) - FOURTH FLOOR			1026
	LED SIDE mounted Fixture (pole)	40	2	80
	LED SIDE Emergency mounted Fixture (pole)	40	1	40
	LED SIDE Wall mounted Fixture	40	7	280
	LED SIDE Wall mounted emergency Fixture	40	2	80
TOTAL WATTAGE(open terrace) - FOURTH FLOOR				480

Floor Name	Illuminated Area (sqm)	Total Wattage	LPD(W/SQM)
BASEMENT	260	1026	3.946
GROUND FLOOR	2838.4	10013	3.528
FIRST FLOOR	2858.5	10501	3.674
SECOND FLOOR	2347.8	4974	2.119
THIRD FLOOR	2347.8	6459	2.751
FOURTH FLOOR	307	1026	3.342
TOTAL LIGHTING POWER DENSITY (LPD)			19

Comparison with Ashrae 90.1.2004 requirements for Exteriors									
Surface Type	Description	Site location / Zone	Lighted Area (sq.m)	Lighted area (sqft)	Fixtures	Type	Fixture Power (watts) Including Ballast Losses	Total Fixtures (nos.)	Total Fixtures Power (Watts)
Tradeable surface	Road Area+Pedestiran Walkway	Hardscape area	5206.70	56044.4523	Street light	LED	60	31	1860
					Wall Light	LED	12	39	468
					Pole Light	LED	25	4	100
Soft Surface Area	Landscape Area	Landscape Area	4200.00	45208.4237	Bollard	LED	16	56	896
Total Illuminated External Area(Sq.ft)				101252.876	Overall Fixtures wattage			3324	

Hardscape Area	
Total Wattage- Proposed case (Watts) for Hardscape area	2428
Proposed Case LPD (W/Sq.ft) for Hardscape area	0.04
Base Case ASHRAE Allowable LPD (W/sq.ft) for Hardscape area	0.1
Base Case Wattage (Watts) for Hardscape area	5604.44523
% reduction for Hardscape area	56.7%

Landscape Area	
Total Wattage- Proposed case (Watts) for landscape area	896
Proposed Case LPD (W/Sq.ft) for landscape area	0.02
Base Case ASHRAE Allowable LPD (W/sq.ft) for landscape area	0.05
Base Case Wattage (Watts) for landscape area	2260.42118
% reduction for landscape area	60.4%

Summary	
Overall Base case Wattage	7864.86641
Overall Propose case Wattage	3324
Base case allowance wattage	750
Overall Basecase Wattage including allowance	8614.86641
Proposed case LPD (W/Sq.ft) Including Hardscape area+ Landscape area	0.0328287
Base case LPD (W/Sq.ft) Including Hardscape area+ Landscape area	0.08508268
% reduction	61.4%



IGBC DOCUMENTATION : CREDITS INVOLVED FOR CERTIFICATION

IGBC Green Data Center Rating System		Credit Points	
		New Data Center	Existing Data Center
Modules		100	100
Site Selection and Planning		8	8
SSP Mandatory Requirement 1	Local Building Regulations	Required	Required
SSP Credit 1	Natural Topography or Vegetation	2	2
SSP Credit 2	Universal Design	1	1
SSP Credit 3	Heat Island Reduction		
	Roof area	2	2
	Non Roof area	2	2
SSP Credit 4	Outdoor Light Pollution Reduction	1	1
Energy Efficiency		51	52
EE Mandatory Requirement 1	Ozone Depleting Substances	Required	Required
EE Mandatory Requirement 2	Commissioning Plan for Data Center Equipment & Systems	Required	NA
EE Mandatory Requirement 3	Minimum Energy Performance	Required	Required
EE Credit 1	Eco-friendly Refrigerants	1	1
EE Credit 2	Enhanced Commissioning	0	1
EE Credit 3	Energy Management System	2	2
EE Credit 4	Enhanced Energy Efficiency	42	42
EE Credit 5	Renewable Energy		
	On - Site	2	2
	Off - Site	4	4
Operation & Maintenance		5	9
OM Mandatory Requirement 1	Management Information System	Required	Required
O&M Credit 1	O&M Systems, measures and practices		
	Real time monitoring of Equipment and Performance	1	3
	Rack cooling index	2	3
	Temperature and Humidity Conditions	2	3

Water Conservation		5	5
WC Mandatory Requirement 1	Rainwater Harvesting, Roof & Non-roof	Required	Required
WC Credit 1	Water Metering	1	1
WC Credit 2	Water Efficient Plumbing Fixtures	2	2
WC Credit 3	Wastewater Treatment and Reuse	2	2
Building Material and Resources		15	10
BMR Mandatory Requirement 1	Policy on waste management	Required	Required
BMR Mandatory Requirement 2	Segregation of Wastes	Required	Required
BMR Credit 1	Use of Certified Green products, materials and equipment	10	5
BMR Credit 2	e - Waste Management	3	3
BMR Credit 3	Non-Hazardous waste & Operations	2	2
Indoor Environmental Quality		10	10
IEQ Mandatory Requirement 1	Tobacco Smoke Control	Required	Required
IEQ Mandatory Requirement 2	Minimum Fresh Air Ventilation	Required	Required
IEQ Credit 1	Indoor air quality Monitoring	3	3
IEQ Credit 2	Day Lighting	2	2
IEQ Credit 3	Low-emitting Materials	4	4
IEQ Credit 4	Occupant Well-being Facilities	1	1
Innovation and Development		6	6
ID Credit 1	Implementation of Innovative Ideas	5	5
ID Credit 2	IGBC Accredited Professional	1	1

IGBC DOCUMENTATION:

The documentation report for submission was done for all the credits given in IGBC new data centre guidelines . The documents were segregated and folders were created for each credit separately .Plan , photographs , bills, specifications , calculations and other documents were enclosed.



IGBC GREEN DATA CENTRE RATING SYSTEM

National Payments Corporation of India



Site Selection & Planning

CR3: Heat Island Effect, Non-Roof & Roof

Points Claimed: 4



Intent:
Minimize heat island effect so as to reduce negative impact on micro-climate.

Compliance Options:

1. Heat Island Effect – Non-Roof areas: (2 points)
Provide one or combination of the following, for at least 50% of exposed non-roof impervious areas within the project site:

- ❖ Shade from existing tree cover/ newly planted saplings within 5 to 8 years of planting
- ❖ Open grid pavers or grass pavers
- ❖ Hardscape materials (including pavers) with SRI of at least 29 (and not higher than 64)

Points are awarded as below:

Non-roof Impervious Area as a Percentage of Total Non-Roof Area	Points
≥ 50%	1
≥ 75%	2

2. Heat Island Effect – Roof areas: (2 points)
Provide at least 50% of the parking spaces under cover.
Points are awarded as below:

Percentage of Parking spaces under Cover	Points
≥ 50 %	1
≥ 75%	2

SSP | CR3



Narrative:
Most cities are sources of heat and pollution, the thermal structure of the atmosphere above them is affected by the so-called "heat island" effect.
The heat that is absorbed during the day by the buildings, roads and other constructions in an urban area is re-emitted after sunset, creating high temperature differences between urban and rural areas
The project team intends to coat its roof area with High SRI coating paints with high reflective properties to minimize the heat island effect to its 100% of exposed roof areas. The standard SRI value of roof coating material to be coated shall be greater than 90.

- All the pavers in the site are coated with SRI between 29 to 64.
- The pavers used in the parking are Grass pavers.

Heat Island effect – Non Roof areas: Option 1:

Total Road area: 3982.94 sq.m
Materials used for Road area (RCC concrete): 41 SRI
Total Pedestrian walkway area: 410.76 sq.m
Materials used for Walkway area (grey paver): 48 SRI
Percentage of area covered with material of required SRI for non-roof area: 100%

Heat Island effect –Roof areas: Option 1:

Total Roof area: 3818.5 sq.m
Area coated with SRI paint: 3618.5 sq.m (122 SRI value)

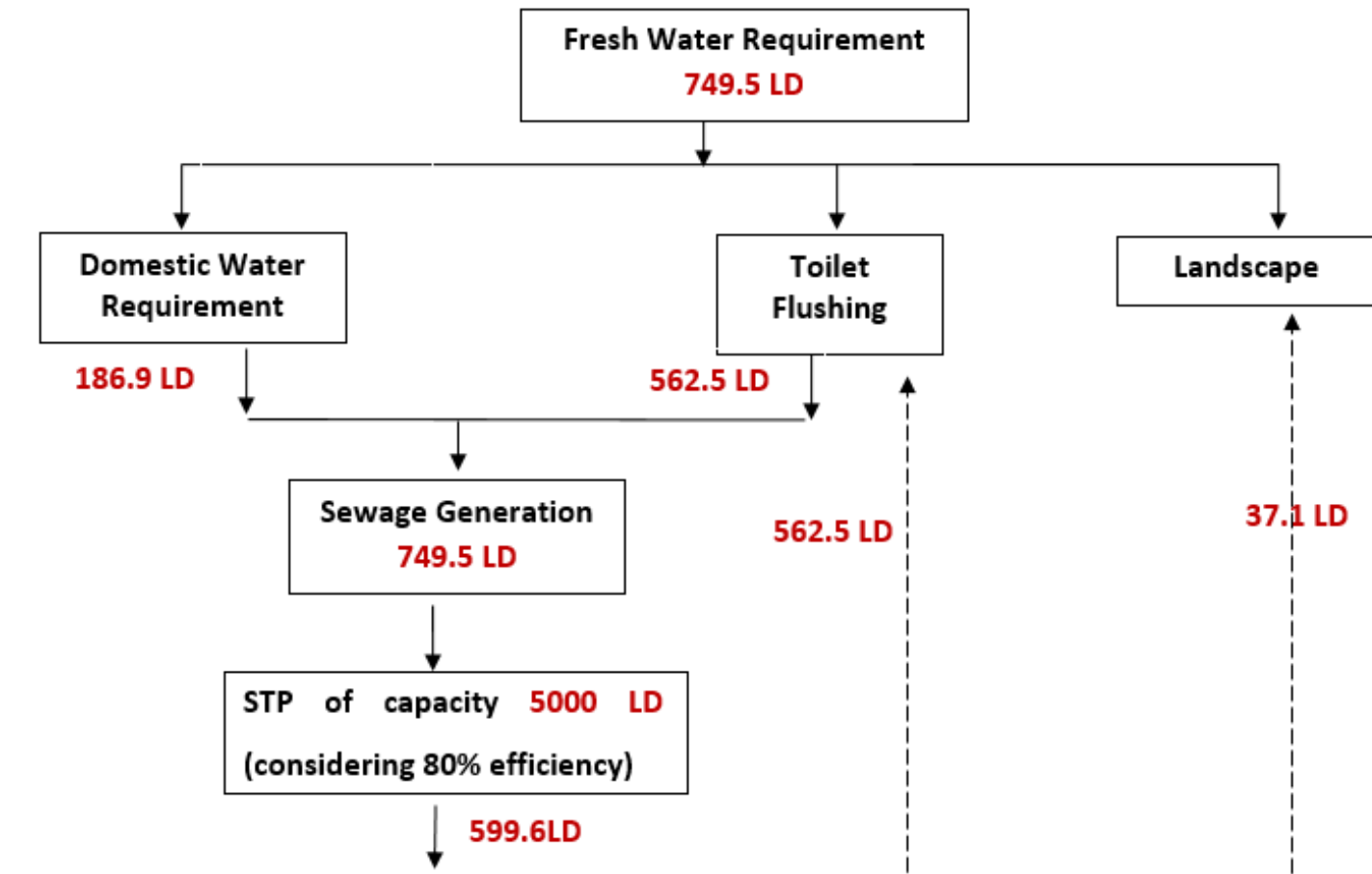
ENCLOSURE:

- Master plan highlighting the non-roof area and roof area with SRI measures
- Test report of non-roof finishes indicating achieved SRI values.
- Specification sheet of SRI paint
- Photograph showing roof and non-roof areas
- Tax invoice of SRI paint

SSP | CR3

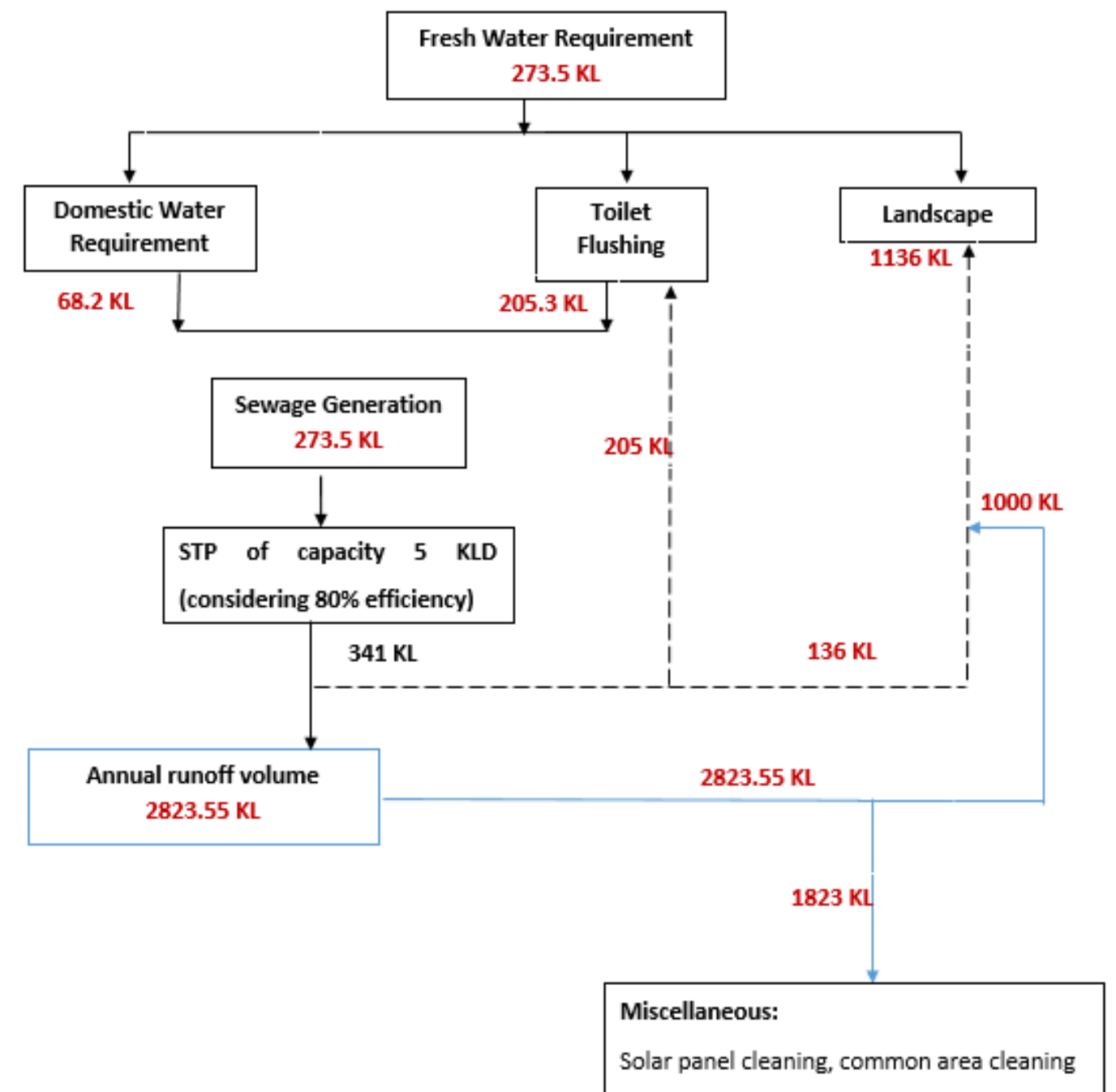
WATER BALANCE CHART

Daily Water Balance Sheet



- STP design capacity as per consultants calculation – 5000 LD
- Total Sewage generated as per IGBC calculation – 749.5 LD
- Treated Water Available as per IGBC calculations –599.6 LD
- Flushing requirement as per IGBC calculations – 562.5 LD
- Irrigation water requirement as per IGBC reference guide 6 liters/Sq.m/day - 37.1 LD

Annual Water Balance Sheet



PROJECT 5

Green Factory Workspace @ Oragadam

TYPOLOGY : Office

LOCATION : Oragadam , Chennai

STATUS : Pre construction (Concept stage)

PROJECT TEAM : Earthonomics Engineers

WORKS DONE : Concept , design ideology and presentation

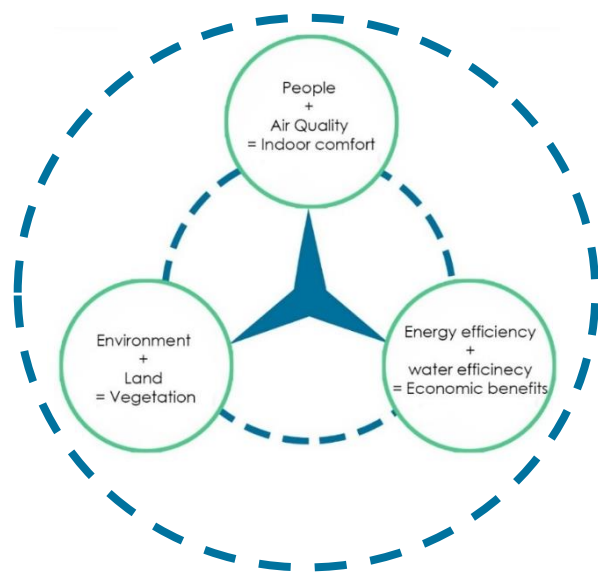


CONCEPT



SUSTAINABILITY PILLARS

DIALMER LOGO PRINCIPLE

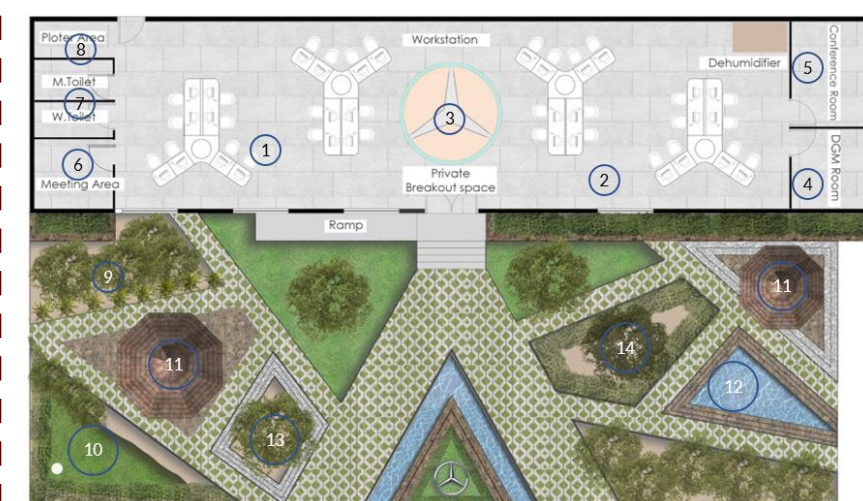


BEFORE RETROFIT



- Large turf area consume more water
- Hard concrete surfaces absorb more heat and does not contribute towards percolation.
- Circulation around the furniture arrangement causes discomfort to the occupants
- There is noise pollution from adjacent factory
- There is heat gain through clear glass windows
- More Artificial light is used during Daytime
- Ac, Artificial light caters towards more energy consumption.

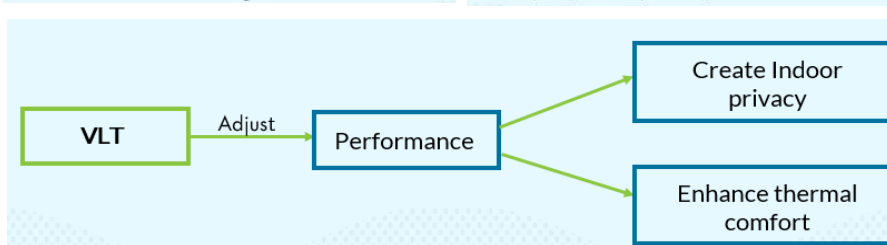
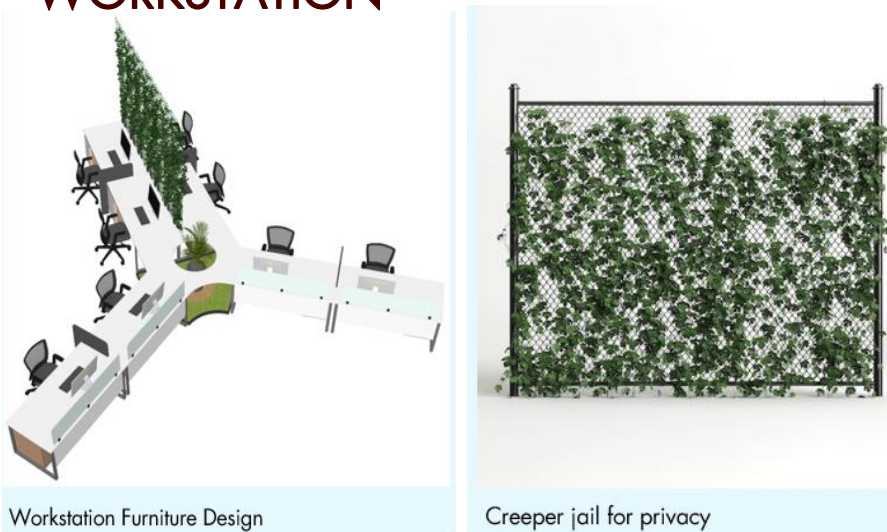
AFTER RETROFIT



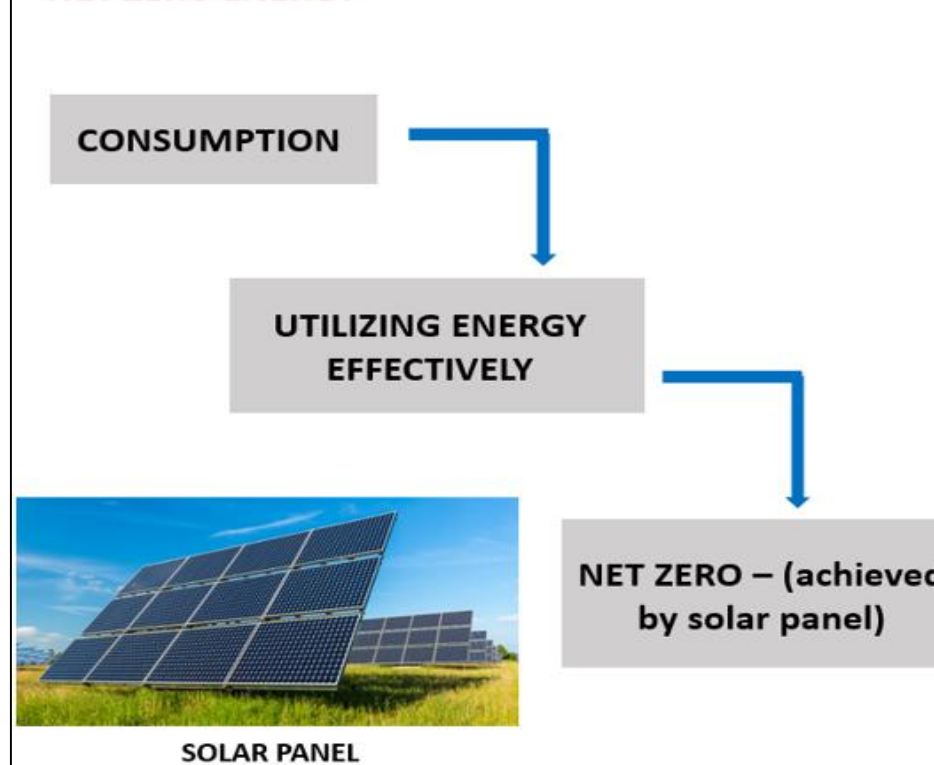
- 1: Work Space
- 2: Radiant Cooling in floor level
- 3: Rainforest
- 4: DGM Room
- 5: Conference room
- 6: Meeting Room
- 7: Toilet
- 8: Plotter Area
- 9: Miyawaki forest
- 10: Golf area
- 11: Gazebo
- 12: Water body
- 13: Sit out Area
- 14: Herbal Garden

- Landscape area divided into mixed mode of vegetation
- Hard surfaces are replaced with grass pavers which caters towards percolation.
- The furniture arrangement has been designed in such way that the occupants circulate without any disturbances
- The glass given is low e having which reduced heat transmittance through fenestration
- Light shelves are given to enhance daylighting.
- Radiant cooling contributes reduction of 30% in energy.

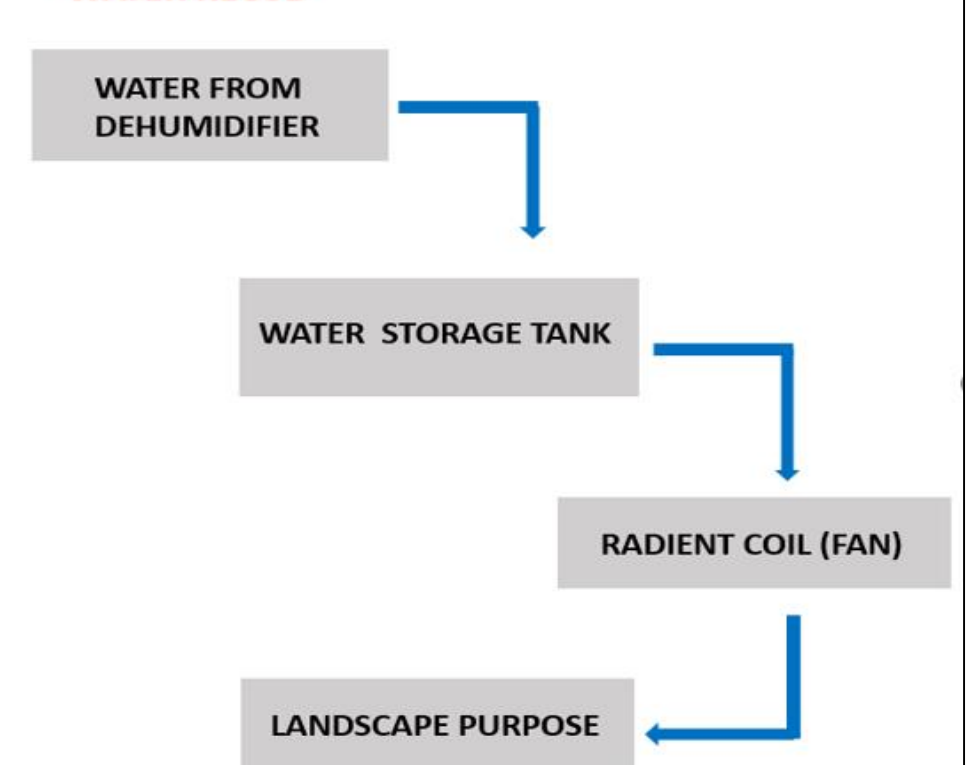
WORKSTATION



NET ZERO ENERGY

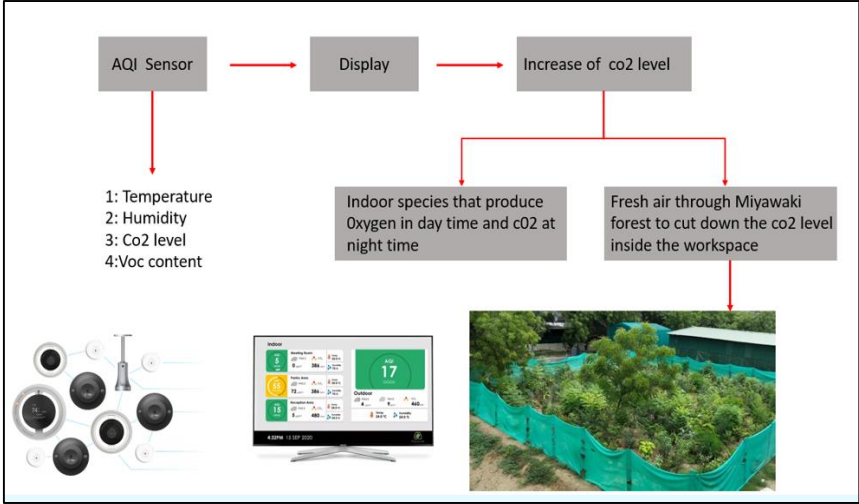


WATER REUSE

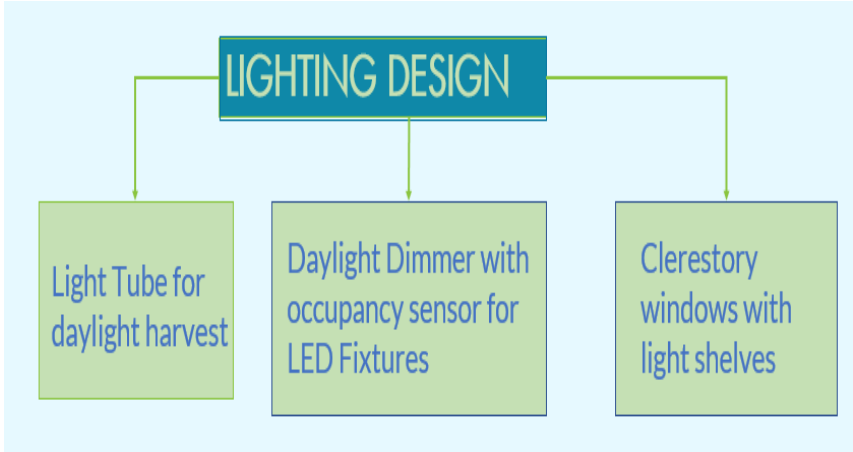


DESIGN STRATEGIES

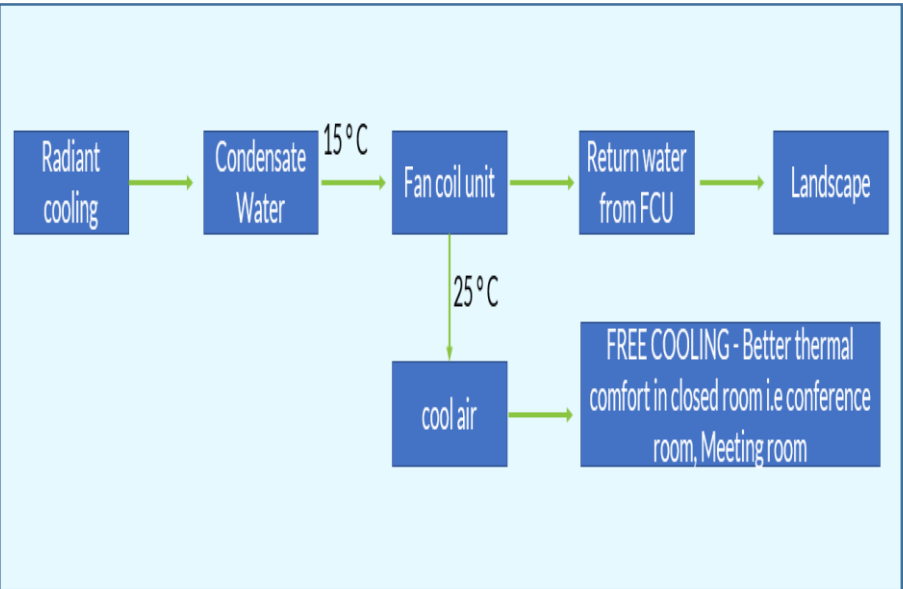
1. AQI systems



3. Daylight for workspace



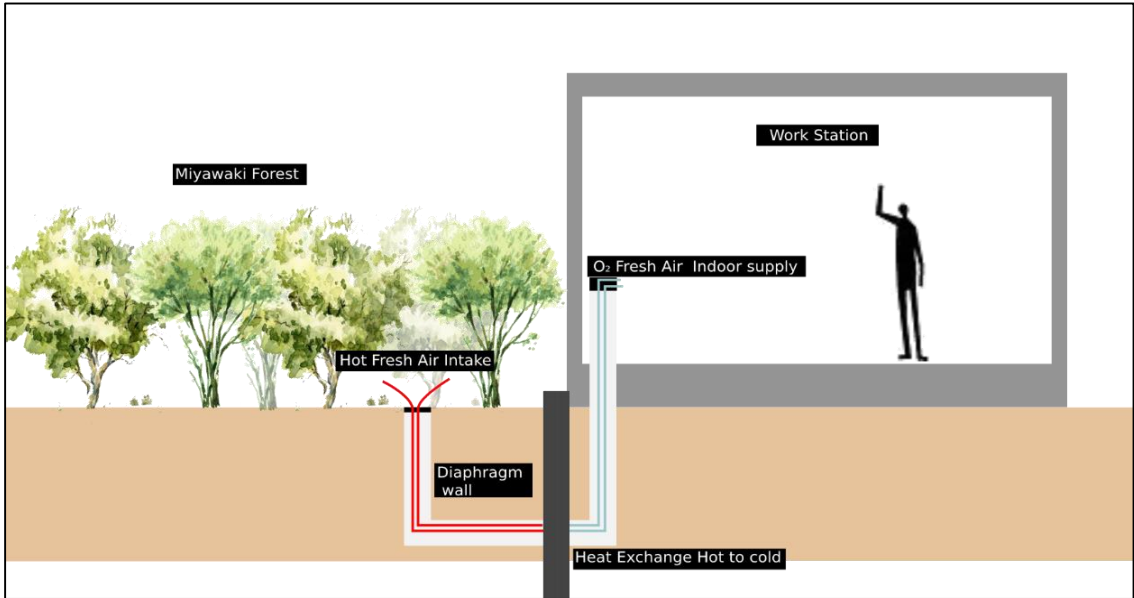
4. Radiant cooling



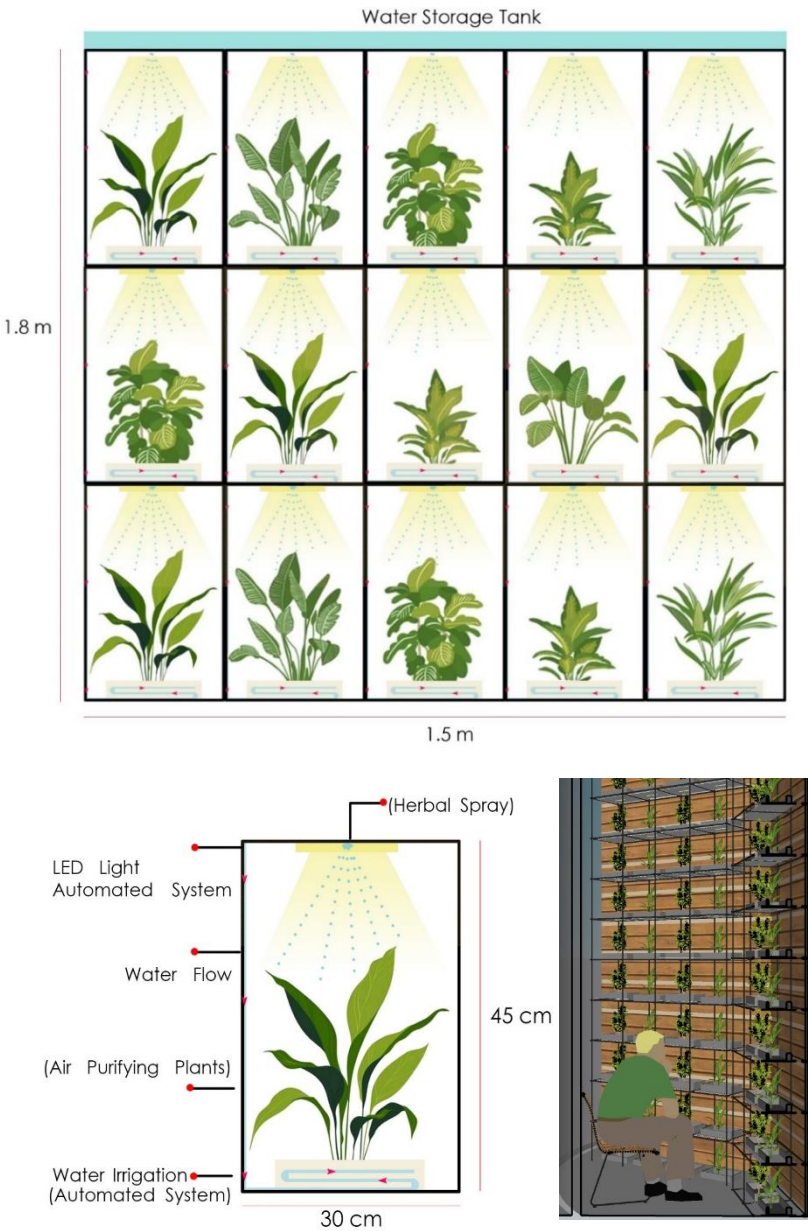
4. Outdoor Lanadscape



5. Geothermal cooling



5. Indoor landscape design



TENTATIVE ESTIMATE FOR CENTRAL MANAGEMENT									
S.no	Strategies	Sub Division	UoM	Materials	Brands	Quantity	Cost	Total Cost	
1	Clerestory window	Light shelves	Sq.ft	Polycarbonate - 10 mm	Kawneer	387.504	95/sq.ft	36812.88	
2	Electrochromic Glass	Glazing	Sq.ft	Glazing	Saint Gobain	452.088	2500/sq.ft	1130220	
	Low E Glass	Glazing	Sq.ft	Glazing	Saint Gobain	452.088	500/sq.ft	226044	
3	Rainforest space	Planters	Sq.m	Indoor Plant + automation+ irrigation+Outer frames		12	2000/sq.m	24000	
		Partition	Ru.ft	plywood 6mm & Mika	Green Ply	452.088	90	40687.92	
		Glass	sq.ft	Double Glazing	Saint Gobain	376.74	300/sq.ft	113022	
4	Landscape design	Turf	sq.ft	Lawn	Sri Bhavani	592	20/sq.ft	11840.4	
		Pavers	sq.ft	Grass Paver	Sri Bhavani	1464	70/sq.ft	102473.28	
		Gazzebo	Nos	Woods	Designer Furniture	2	60000/unit	120000	
		Mini Golf	sq.ft	Golf equiment + Turf		430.56	4000/unit	16916.8	
		Herbal Garden	sq.ft	Plantes		20	700 per sapling	14000	
		Water pond	sq.ft	Water Proofing Tiles + Concrete		222	1400/sq.ft	310584	
		Stone	sq.ft	Pebble stone	Hindustan	700	150/sq.ft	104949	
		Miyawaki forest	Planters	Nos		78	700 per sapling	54600	
		6	Noise reduction	Acoustic	sq.ft	Fibre acoustic	Indus solution	699.66	150/sq.ft
	Planters			sq.m	Indoor Plant + automation+ irrigation+Outer frames		54	2000/sq.m	108000
7	Recreation and Amenities	Equipment	Nos	Ergonomic seating		2	23920/unit	47840	
		Equipment	Nos	Threadmill		1	24000/unit	24000	
		Equipment	Nos	Table soccer - Indoor play area		1	12000/unit	120000	
8	Workstation	Furniture	sq.ft	plywood+ Mika+accessories		4	24000/unit	96000	
		Planters	sq.m	Indoor Plant + automation+ irrigation+Outer frames		18	2000/sq.ft	36000	
9	Indoor Air Quality	Planters	Nos			50	200/sapling	10000	
10	Light tubes	Daylighting	Nos		Star Roofing	120	25000/unit	3000000	
9	Radiant cooling	HVAC	Sq.ft	Radiant cooling + coil+installation		2540	525/ sq.ft	1333660	
10	Geothermal cooling - Fresh air	Fresh Air	Sq.ft	Duct + Under ground digging+ insulation		52	800/sq.ft	41333.76	
				Fans		2	6300/Unit	12600	
				Filter		2	4300/Unit	8600	
			Nos	Diaphram Wall		1	120000/unit	120000	
11	AQI system	Indoor Monitoring system	Nos	Automation		1	250000/unit	250000	
12	Water conservation (Low Flow Fixtures)	Fixtures	Nos	Closet + Dual Flush	Jaquar	2	28500 per Nos	57000	
		Fixtures	Nos	Urinal + Sensor	Jaquar	1	12500 per Nos	12500	
		Fixtures	Nos	Health faucet	Jaquar	2	2350 per Nos	4700	
		Fixtures	Nos	Washbasin + Sensor	Jaquar	2	11300 per Nos	22600	
		Fixtures	Nos	Faucet	Jaquar	2	11050 per Nos	22100	
Total Tentative Material cost for Central Management Building								7738033.096	
Total Tentative Labour cost for Central Management Building								1934508.274	
Total Tentative Total cost for Central Management Building								9672541.37	
		Technology/features/Measures with payback							
		Intangible benefits include productivity, Thermal comfort, and Therapeutic benefits							

PROJECT 6

Green Factory @ Kanchipuram

TYPOLOGY : Commercial

LOCATION : Porur highway, Kanchipuram

STATUS : Constructed (ongoing IGBC certification)

PROJECT TEAM : L&T Construction

WORKS DONE : Site audit , Mom , Preliminary feasibility report



MINUTUES OF MEETING

Date: 18-08-2022

Agenda: Preliminary Site Audit & Building Review

Key Points discussed:

- Preliminary Site audit was carried out.
- Requirements for the certification were discussed.
- Areas to be improved and focussed were discussed.
- ☐ Photographs of landscape, parking, existing building and amenities in the facility were taken.
- ☐ Occupants details has been shared
- ☐ Details of the lighting fixtures, Toilet fixtures and Refrigerants used in Ac was shared.
- ☐ Amenities provided in the facility (Solar powered street lights, medical centre, and Breakout space)
- ☐ Details of all internal & external lighting fixtures to be shared – Project Team
- ☐ Requirements (Documents and photographs) for the certification to be shared by the Facility manager – Project team
- Details of rainwater harvesting systems shared
- Waste management policy and disposal discussed
- Energy monitoring systems are used in the facility
- Discussion about current status of the project

FEASIBILTY REPORT AFTER SITE VISIT : IGBC GREEN FACTORY CREDIT

MATERIAL CONSERVATION

MATERIAL CONSERVATION	POINTS AVAILABLE	POINTS ACHIEVABLE
Handling of non-process waste	Mandatory	Required
Waste reduction during construction	2	2
Material with recycled content	2	1 (1)
Local Materials	4	4
Material Reuse	4	(4)
Certified wood/ Rapidly renewable building material	4	4
Total	16	11 (5)

Target points achievable

11

NEED TO BE DISCUSSED/ ACTION REQUIRED/NOT ATTEMPTED

5

MATERIAL CONSERVATION	POINTS AVAILABLE	COMPLIANCE REQUIREMENT
Handling of non-process waste	-	<i>Construct central waste segregation yard on-site with dry & wet bins in each floors</i>
Waste reduction during construction	2	Segregate construction waste generated on-site and reuse/sell to vendor
Material with recycled content	2	Use materials with recycled content of atleast 10%
Local Materials	4	Ensure that atleast 50% of the total building materials are within a radius of 500 Km
Material Reuse	4	Ensure atleast 5% of the total building materials is salvaged, refurbished and reused
Certified wood/ Rapidly renewable building material	4	Ensure atleast 50% (by cost) of all wood based products are FSC certified

PROJECT 7

Green Campus @ Chennai

TYPOLOGY : Institutional

AREA: 997064 sq.m

LOCATION : Kalavakkam, Chennai

STATUS : Constructed (ongoing IGBC certification)

PROJECT TEAM : Unknown

WORKS DONE : Energy calculation and Checklist



Computer Science Eng Block						
Fixtures	Watt	No of Fixture	Wattage	Opertional Hours	Working days	Annual Energy Kwh
Tube Light -2 Nos	72	285	20520	9.6	240	47278080
Tube Light	36	45	1620			3732480
LED Tube	18	174	3132			7216128
CFL Fitting 2 Nos	22	84	1848			4257792
2 Feet LED Fitting 2Nos	44	12	528			1216512
Overall wattage			27648	Annual energy consumption for Computer Science Eng Block		63700.992
Builtup Area (sq.ft)			52696.2384			
Basecase LPD (W/sq.ft) as per ASHARE 90.1.2010			0.99			
Proposed LPD (W/sq.ft)			0.52			
overall savings - Base case vs proposed case			47%			
IT Block						
Fixtures	Watt	No of Fixture	Wattage	Opertional Hours	Working days	Annual Energy Kwh
Tube Light -2 Nos	72	225	16200	9.6	240	37324800
Tube Light	36	177	6372			14681088
LED Tube	18	35	630			1451520
CFL Fitting 2 Nos	22	76	1672			3852288
Overall wattage			24874	Annual energy consumption for IT Block		57309.696
Builtup Area (sq.ft)			52696.2384			
Basecase LPD (W/sq.ft) as per ASHARE 90.1.2010			0.99			
Proposed LPD (W/sq.ft)			0.47			
overall savings - Base case vs proposed case			52%			
ECE OLD Block						
Fixtures	Watt	No of Fixture	Wattage	Opertional Hours	Working days	Annual Energy Kwh
Tube Light -2 Nos	72	587	42264	9.6	240	97376256
Tube Light	36	61	2196			5059584
LED Tube	18	23	414			953856
Overall wattage			44874	Annual energy consumption for ECE OLD Block		103389.696
Builtup Area (sq.ft)			88398.91944			
Basecase LPD (W/sq.ft) as per ASHARE 90.1.2010			0.99			
Proposed LPD (W/sq.ft)			0.51			
overall savings - Base case vs proposed case			49%			
ECE ANNEX Block						
Fixtures	Watt	No of Fixture	Wattage	Opertional Hours	Working days	Annual Energy Kwh
LED Tube	18	395	7110	9.6	240	16381440
2 Feet Micro tube Fitting 2 Nos	36	98	3528			8128512
LED Round Fitting	10	55	550			1267200
CFL False Ceiling	18	60	1080			2488320
Overall wattage			12268	Annual energy consumption for ECE ANNEX Block		25777.152
Builtup Area (sq.ft)			25845.4404			
Basecase LPD (W/sq.ft) as per ASHARE 90.1.2010			0.99			
Proposed LPD (W/sq.ft)			0.47			
overall savings - Base case vs proposed case			52%			

CHECKLIST FIR CERTIFICATION

Checklist - IGBC Green Existing Campus			
IGBC Green Campus Rating System		Points Available	Points Attempted
		Existing Campuses	
Modules		90	
Site Planning and Management		22	
SPM MR 1	Green Buildings within the Campus	Required	Required
SPM MR 2	Soil Erosion Control	Required	Required
SPM Credit 1	Green Buildings within the Campus	10	10
SPM Credit 3	Green Cover or Vegetation	6	6
SPM Credit 4	Heat Island Reduction, Non-roof	4	4
SPM Credit 5	Outdoor Light Pollution Reduction	2	2
Sustainable Transportation		11	
ST Credit 1	Pedestrian Network	3	3
ST Credit 2	Bicycle Lanes Network	4	2
ST Credit 3	Access to Sustainable Transportation	4	4
Water Conservation		18	
WC MR 1	Rainwater Harvesting	Required	Required
WC Credit 1	Rainwater Harvesting	6	4
WC Credit 2	Landscape Design	4	4
WC Credit 3	Management of Irrigation Systems	2	2
WC Credit 4	Wastewater Treatment and Reuse	4	4
WC Credit 6	Water Metering	2	1
Energy Efficiency		21	
EE Credit 1	Energy Efficiency in Infrastructural Equipment	10	7
EE Credit 2	On-site Renewable Energy	5	5
EE Credit 3	Off-site Renewable Energy	4	NA
EE Credit 4	Energy Metering	2	2
Material and Resource Management		3	
MRM MR 1	Segregation of Waste, Post-occupancy	Required	Required
MRM Credit 1	Organic Waste Management, Post- occupancy	3	3
Health & Well-being		6	
HWB MR 1	Tobacco Smoke Control	Required	Required
HWB Credit 1	Basic Amenities	1	1
HWB Credit 2	Health & Well-being Facilities	4	4
HWB Credit 3	Universal Design	1	0
Green Education		3	
GE Credit 1	Green Education	2	2
GE Credit 2	Green Campus Guidelines	1	1
Innovation in Design		6	
ID Credit 1	Innovation in Design Process	4	4
ID Credit 2	IGBC Accredited Professional	2	2

The threshold criteria for certification levels are as under:			77
Certification Level	Existing Campus	Recognition	
Certified	36 – 44	Best Practices	
Silver	45 – 53	Outstanding Performance	
Gold	54 – 66	National Excellence	
Platinum	67 – 90	Global Leadership	

USAGE HOURS OF THE LIGHTING FIXTURES

LIGHTING SCHEDULE			
Area	Percentage used in an hour	Hours	Total Hours
Students Zone	0	13	0
	0.6	1	0.6
	0.9	10	9
Total			9.6
Back Office	0	14	0
	0.3	1	0.3
	0.5	1	0.5
	0.9	8	7.2
Total			8
Library & Computer Centre	0	9	0
	0.2	1	0.2
	0.9	14	12.6
Total			12.8

Source: The standard values are taken from table 9.14 (ECBC 2017)

ENERGY CALCULATIONTHROUGH LIGH FIXTURES

EFFICACY	TOTAL WATTAGE (KW)	TOTAL WATTAGE	FIXTURE WATTAGE	NO. OF FIXTURES	TYPES OF FIXTURES	OPERATIONAL HOURS	NO. OF DAYS	ANNUAL RUNNING HOURS	ANNUAL ENERGY CONSUMPTION (KWH)	RATE PER UNIT	COST OF FIXTURE	LIFE TIME OF FIXTURES (HRS)	TOTAL INVESTMENT COST	LPD
120	43.75	43750	15	2916.666667	LED	12	365	4380	191625	5	450	5000	1312500	4.16
60	87.5	87500	45	1944.444444	CFL	12	365	4380	383250	0	250	1200	1774300	8.33

SOLAR PANNEL	UNITS	UNITS	NO OF PANNELS	AREA REQ. FOR PANNELS
1	4	525	131.25	11.8125
1	4	1050	262.5	23.625

TOTAL UNITS	TOTAL MONEY	TOTAL COST OF FIXTURE	FIXTURES REQUIRED	TOTAL FIXTURES REQ
191625	1916250	1312500	0.876	65
383250	3832500	486111.1111	3.65	7097

